RAILROAD GAZETTE

FRIDAY, MAY 22.

## Master Car-Builders' Association—Annual Convention.

The announcement of the annual convention as issued from the Secretary's office under date of May 15 is as follows:

The nineteenth Annual Convention of the Master Car-Builders' Association will be held in the Hygeia Hotel at Old Point Comfort, Va., beginning on Tuesday, June 9, at 10 a. m. The following is a list of the subjects on which it is expected that special reports will be made, and which will be discussed during the sessions of the Convention.

1. A Standard Form for the Treads and Flanges of Wheels.
2. Standard Freight-Car Trucks.
3. Brake Shoes, Brake Beams, and Interchangeable Parts of the Brake Arrangements of Cars.
4. Standard House Car to Carry 60,000 pounds of Lading.
5. Standards and Appliances for the Safety of Trainmen.
6. Passenger-Car Framing and Trussing.
7. Automatic Freight-Car Brakes.
8. Freight-Car Roofs.
9. Trap Doors in the Roofs of Passenger Cars.
10. Side-Dumping and Drop-Bottom Coal Cars.
11. Standard Dead Blocks.
12. The Comparative Advantages of the Two Methods of Constructing Freight Cars, with and without Platform Timbers or End Sills Projecting from the End of the Car.

A meeting for the revision of the "Rules Governing the Condition of and Repairs to Freight Cars for the Interchange of Traffic" will be held on the first day of the Convention, Tuesday, June 9, at 3 p. m.

A special meeting has also been called by the Executive Committee of the Association for the consideration of "the Automatic Coupler Question." This meeting will be held on Wednesday, June 10, at 3 p. m., and all Railroad Managers, General Superintendents and Railroad Commissioners have been invited to attend and take part in that meeting, or to send a suitable person to represent them.

The Constitution provides that: "Any person holding a position of Superintendent of the Car Department, Master Car Builder, or Foreman of a railroad-car shop, or one representative from each car-manufacturing company, or other company owning over 1,000 cars which are not in process of purchase by other parties, may become an Active Member by paying his dues for one year.

"Any person having a practical knowledge of car construction may become a Representative Member by receiving a *written* appointment from the President, General Manager or General Superintendent of any railroad company, to represent its interest in the Association, provided that no Representative Member shall represent more than one railroad or system of roads under one General Manager or General Superintendent. Such member shall have all the privileges of an Active Member, including one vote on all questions: and in addition thereto, shall on all measures pertaining to the adoption of standards or the expenditure of money, have one more vote for each full 1,000 cars which are owned, or which are in use and in process of purchase, by the road or system which he represents. His membership shall continue until notice is given the association of his withdrawal or of the appointment of his successor. No railroads or systems of roads, under one General Manager or General Superintendent, shall have more than one Representative Member. In the enumeration of four, six, eight, or more wheeled cars, four axles to count as one car.

"Every member will be subject to the payment of annual dues, to be assessed at each annual meeting, to defray the necessary expenses of the Association, provided that no assessment shall exceed $5. Each Representative Member shall pay in addition to his own dues so assessed the same amount for each additional vote to which he is entitled."

All persons who are eligible and who are not now members, are invited to join the Association at its next convention.

Arrangements have been made with the proprietor of Hygeia Hotel for the accommodation of members of the Association during the session of the Convention at $3 per day. Those disposed to engage rooms in advance should communicate with Mr. H. Phœbus, proprietor of the hotel.

Members from the West can reach Old Point Comfort by the Chesapeake & Ohio Railroad, or they, and those from the North and East, can go *via* Washington and Richmond or by way of Baltimore, and thence by night steamboat to Old Point Comfort. The boat connects with the train from New York, which arrives in Baltimore at 8.45 p. m. The regular fare from Baltimore to Fortress Monroe is $3, round trip $5. Eastern members can also go *via* Wilmington, Del., and from there by the New York, Philadelphia & Norfolk Railroad to Cape Charles, and thence to Old Point Comfort by boat. A number of members propose to go by sea from New York, taking the Old Dominion steamboat, from Pier 26, foot of Beach street, on Saturday afternoon, June 6, at 3 o'clock. The regular fare, including meals and stateroom, is $8.50. For a party of 25 or more the fare will be reduced to $6, or $11 for the round trip. Persons who intend to take this route will please advise the Secretary.

At a recent meeting of the Executive Committee, a resolution was adopted instrucing the President and Secretary to do all in their power to have the request with reference to the entertainment of members of the Association during the Conventions, which was contained in a resolution adopted in 1875, complied with. The following is the resolution referred to:

"*Whereas*, The practice of entertaining the members of this Association by its friends has become an established custom, and has thus assumed somewhat the character of an obligation to which those who have so generously dispensed hospitality have, in a measure, felt themselves obliged to conform; and

"*Whereas*, The expenditure of time and money for this purpose has in many cases been very much greater than the members of this Association have the right to expect should be devoted to their enjoyment; and

"*Whereas*, The expense of such hospitality has in some cases been interpreted as having a significance which has been the cause of embarrassment to members:

"*Therefore*, We desire by this resolution, first, to express our thanks for the liberality of our friends in the past; and, secondly, to make the request in this public way, that in the future there shall be no more expenditure of money for the public entertainment of members of this Association."

In compliance with these instructions, the President and Secretary of the Association express the hope that there will be no subscription of money in future for the entertainment of the members, and that the Association may thus be relieved of the duty of declining proffered hospitalities.

LEANDER GAREY, President.
M. N. FORNEY, Secretary.

Representative members are requested to report to the Secretary either before or at the convention the number of cars owned by their companies. The Secretary's address is at No. 73 Broadway, New York.

## Master Car-Builders' Association—Car Coupler Meeting.

The following circular from the Executive Committee relating to Automatic Car Couplers has been issued under date of May 15, and is addressed to railroad officers and others interested.

In a number of states the use of some form of Automatic Safety Car Coupler has been made obligatory on railroads by legislative enactment. In most, if not all, of the laws of this kind which have been passed, the special form or kind of coupler to be used is not specified, but it is left to the Railroad Commissioners of each state to decide what couplers will comply with the requirements of the law of that state. This will naturally lead to the adoption of a variety of couplers on the different railroads of the country, and it is believed, that while legislation of this kind may *temporarily* satisfy the popular clamor for some action which will reduce the risk and danger of coupling cars, it seems probable that unless the railroad companies agree to use either one form of self-coupler, or only such forms as can safely be used in connection with each other, that the danger to the men who couple cars will be increased instead of diminished by this action of the state legislatures.

At the last convention of the Master Car-Builders' Association a resolution was passed instructing the Executive Committee to solicit the co-operation of all railroad companies in an attempt to decide experimentally the comparative merits of various automatic car couplers.

After due consideration the Committee do not feel sure that it would be possible to determine by experiment which is the best form or forms of self-couplers, or if it was so determined, whether it would be possible to secure its general adoption by the railroad companies of the country. For that, and for other reasons, the Committee have determined to make "the Coupler Question" the subject for consideration at a special meeting, which will be held in the Hygeia Hotel, at Fortress Monroe, Va., on Wednesday, June 10, 1885, at 3 p. m., at which place the next annual convention of the Master Car-Builders' Association will be held, beginning on Tuesday, June 9, at 10 a. m., and to invite all railroad managers, general superintendents and railroad commissioners to attend and take part in that meeting, or else send a suitable person to represent them.

You are requested to advise the Secretary whether you will be present at, or will send a representative to that meeting. A suitable postal card is enclosed for your reply.

LEANDER GAREY, JOHN W. CLOUD, JOHN KIRBY, L. PACKARD, F. D. ADAMS, WM. MCWOOD, B. K. VERBRYCK, T. A. BISSELL, JOHN S. LENTZ, JOSEPH TOWNSEND,
E. B. WALL,
Executive Committee.

## American Society of Civil Engineers—Annual Convention.

The annual convention of this Society for the year 1885 will be held at Deer Park, Md., on the line of the Baltimore & Ohio Railroad, June 24, 25, 26 and 27. Sessions for professional discussion and one for the transaction of business will be held.

Members from the West may leave Cincinnati on Tuesday, June 23, at 8.50 a. m., arriving at Deer Park 11.14 p. m., or leave Cincinnati at 7.20 p. m., arriving at Deer Park 7.30 a. m.

All members who can do so are invited to arrive at Baltimore on Monday, June 22, and take part in the excursion named below.

Train leaving New York (Pennsylvania Railroad) at 8 a. m., Philadelphia 10.16 a. m., arrives at Baltimore at 12.35 p. m.

By invitation of the officers of the Baltimore & Ohio Railroad Co., a steamer excursion will be made by members and their families on Monday afternoon, June 22, to the Water Front of the Harbor of Baltimore, the Marine Terminals of the B. & O. R. R., Locust Point, Canton, Fort Carroll, Fort McHenry and Curtis Bay, returning to Baltimore early in the evening.

Those who desire to visit the Water Works of Baltimore are invited to do so on Monday afternoon, leaving the hotel at the same time as the party for the steamer. Provision will be made for such visit, under the escort of R. K. Martin, Chief Engineer, Baltimore Water Works.

Members and their families are invited to visit the summer evening concert at the Baltimore Academy of Music, on Monday evening, under the escort of the Local Committee of members of the society and officers of the Baltimore & Ohio Railroad. This Committee will have charge of all arrangements at Baltimore.

Headquarters at Baltimore will be at the Carrollton Hotel, where arrangements at special rates have been made for the accommodation of those attending the Convention.

On Tuesday morning, June 23, a special train will leave Camden Station, Baltimore & Ohio Railroad, Baltimore, at 9:10 a. m. The round-trip tickets referred to below will be requisite on this train. They will also be good for any other trains during the Convention week.

Those who may be unable to arrive earlier can take train leaving New York at midnight of Monday, June 22, and arrive at Baltimore at 6:45 a. m. Tuesday, in ample time for breakfast and for taking the special train at 9:10 a. m.

Members from the South and West can also arrive by the early morning trains.

This train will first stop at the general shops of the road at Mt. Clare, Baltimore, and an inspection of the shops will be made. The train will then proceed over the B. & O. R. R. to Deer Park, stopping at Harper's Ferry and a number of other points of special interest.

Deer Park will be reached in the early evening.

The sessions will be held during Wednesday, Thursday, Friday and Saturday, except that on one of those days, to be specially announced hereafter, an excursion will be made by invitation of the B. & O. R. R. to the Cheat River Grade, Kingwood Tunnel, Tray Run Viaduct and other interesting points on the Mountain Division of the road.

The rate at the Deer Park Hotel for those attending the Convention will be $3 per day. The hotel is very large, commodious and well kept.

Convenient arrangements will be made for Western members who desire to visit Washington and Baltimore after the Convention.

Trains for either the West or the East may be thus taken on Saturday afternoon or evening after adjournment of the Convention; or a stay may be made at Deer Park over Sunday.

The Baltimore & Ohio Co. over its entire system, also including the Ohio & Mississippi Railroad from St. Louis and Louisville, will sell round-trip tickets for one fare going and returning. This will extend to Baltimore and Washington on the East, and Cincinnati, Chicago, St. Louis, Louisville, Pittsburgh, Columbus and Toledo on the West.

Special arrangements for transportation will be made for other points, and announced to members notifying their desire to attend.

Limits of tickets and further arrangements as to transportation will be announced on special inquiry.

The special tickets from places named above will be on sale on and after June 20, and to secure them, a certificate of authority must be presented signed by the Secretary of the Society.

Special programmes, with the titles of papers to be read and subjects to be discussed, will be prepared and issued.

The President of the Society, Frederic Graff, will deliver the annual address at one of the sessions to be held at Deer Park.

Members of the Society are invited to transmit to the Secretary papers that they are willing to present at this Convention, in order that a place may be given for them in the programme.

The families of members are invited to accompany them to the Convention.

The probability seems to be that this Convention will have a very large attendance from all parts of the country.

The committee of members of the society resident at Baltimore consists of Charles H. Latrobe, Mendes Cohen, Francis H. Hambleton, Edward S. Safford, Frederick H. Smith and Jared A. Smith. Messrs. C. K. Lord, James L. Randolph, W. N. Bolling and William P. Harris constitute a committee of officers of the Baltimore & Ohio Co.

In addition to the papers published in the *Transactions* during the past year, and to those of which abstracts have been issued in the records of meetings, the following papers, not yet published, are also open for discussion. Abstracts of either of these will be sent to members who desire to discuss them:

Electrical Transmission from Niagara: Benjamin Rhodes.
Steel: E. B. Dorsey.
Water Rates: J. James R. Croes.
Formulas for the Weights of Iron and Steel Railway Bridges under standard specifications: George H. Pegram.
The Harbor Works of Copenhagen, Denmark: H. C. V. Moller.
On the Strength of Columns: Thomas H. Johnson.
The Problem of the Submerged Weir: Clemens Herschel.

It is expected that papers on several interesting subjects will be presented.

The full report from the Committee on the Preservation of Timber will be presented and discussed. Reports are expected from other committees.

Discussion is requested upon any of the above subjects by members who cannot attend the convention.

The Secretary will be glad to present these if forwarded to him previous to the convention.

It is desirable that papers offered for presentation at the convention be sent to the Secretary not later than June 1, so that proper attention may be given the subjects presented.

## Awards at the New Orleans Exposition.

The following are the awards of the juries at the New Orleans Exposition in group 6, class 610, including the railroad exhibits:

LOCOMOTIVES.

Baldwin Locomotive Works, Philadelphia—Display of locomotives, medal of first class; passenger locomotive, medal of second class; best mogul and ten-wheel freight locomotive, medal of first class.

Bucyrus Foundry & Manufacturing Co., Bucyrus, O.—Tramway locomotive, medal of first class.

La Métallurgique Société Anonyme de Construction, Brussels—Passenger tramway engine, medal of first class.

Lima Machine Co., Lima, O.—Standard gauge logging engine, medal of first class; fire extinguisher attachment readily adapted to any locomotive, medal of first class.

Pittsburgh Locomotive Works, Pittsburgh, freight and passenger locomotive, medal of first class; passenger locomotive, honorable mention.

H. K. Porter & Co., Pittsburgh, Pa., logging locomotive narrow gauge, medal of second class.

Roanoke Machine Works, Roanoke, Va., hopper bottom gondola car, medal of first class; box freight car, medal of second class; broad gauge consolidated locomotive, medal of first class.

Rhode Island Locomotive Works, Providence, narrow gauge locomotive, medal of first class.

Rogers Locomotive Works, Paterson, N. J., best passenger locomotive, medal first class.

CARS.

Butterworth & Lowe, Grand Rapids, Mich., logging cars, medal of second class.

De Cauville Aune, France, display of portable railway wagons for portable railway, medal of first class.

Feigel Car Co., New Utrecht, N. Y., closed street car, medal of the second class.

Harlan & Hollingsworth Co., Wilmington, Del., railway passenger car, medal of first class.

C. B. Hutchins, Detroit Junction, Mich., refrigerator car, medal of first class.

Jackson & Sharp Co., Wilmington, Del., sleeping and day car, medal of second class.

Kalamazoo Railroad Velocipede Co., Kalamazoo, Mich.—Hand cars, medal of first class; velocipede cars, medal of first class.

Achille Legrand, Belgium—Best portable railway truck or dump car, medal of first class; railway portable track, medal of second class.

Mann Boudoir Car Co., New York—Boudoir or compartment car, medal of first class.

Marks Adjustable Car Chair Co., New York—Railroad reclining chairs, medal of first class.

Pullman's Palace Car Co., Chicago—Railroad parlor car, medal of first class; sleeping and day car combined.

Russell Wheel Foundry Co., Detroit, Mich., logging cars, medal of first class; sugar cane cars, medal of first class; lumber car, second class medal; ore car, honorable mention.

John Stephenson Co. (limited), New York, closed street car, medal of first class; conductor's street car telephone, medal of first class; ventilated street car ceiling, medal of first class; street car sash, medal of first class; street car brake handle, honorable mention.

United States Tube Rolling Stock Co., New York, freight cars, medal of first class.

WHEELS, TRUCKS AND SPRINGS.

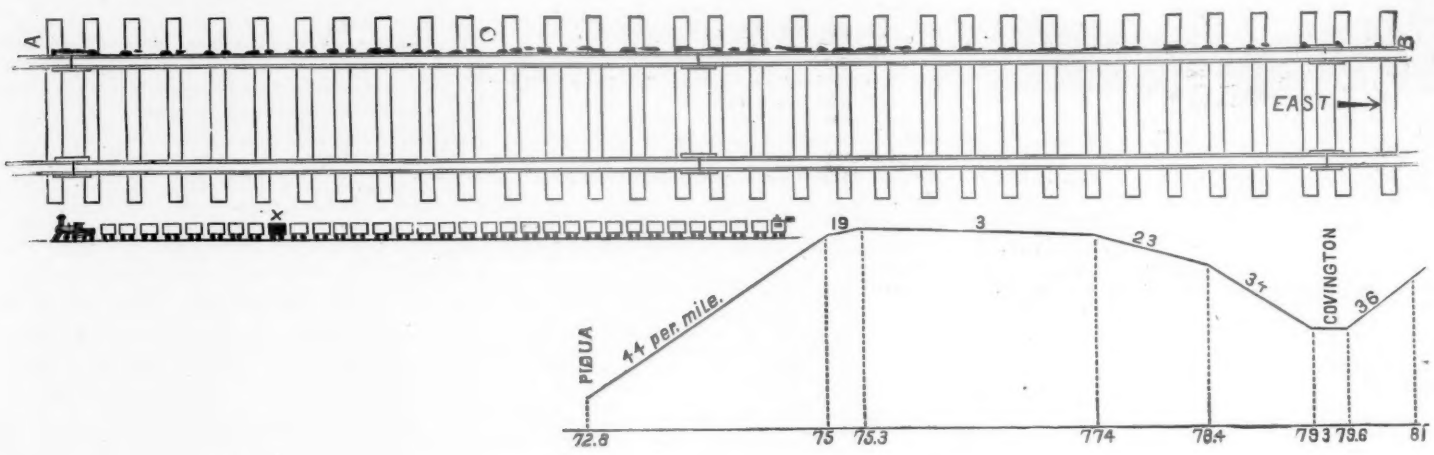
Allen Paper Car Wheel Co., New York, paper car wheels, medal of first class.

Baltimore Car Wheel Co., Baltimore, Md., method of casting car wheels, medal of first class; dust guard for axle boxes, medal of first class; steam car truck, medal of second class; setting for steel tire, medal of second class; street car axle box, honorable mention.

Caicago Tire & Spring Works, Chicago, Ill., locomotive tires, medal of first class; elliptic locomotive and car springs, medal of second class.

A. French Spring Co. (limited), Pittsburgh, Pa., elliptic

# A REMARKABLE ACCIDENT.



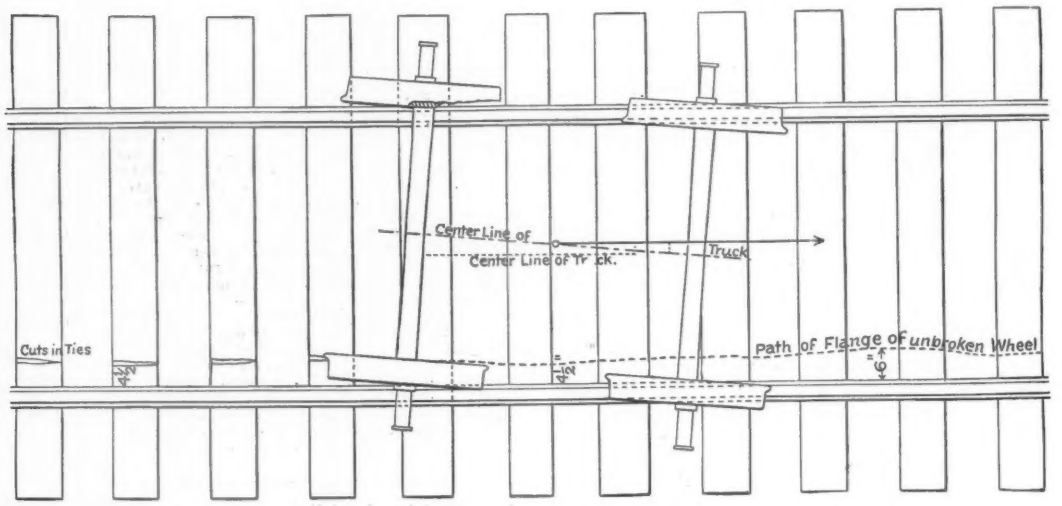




Fig. 1.

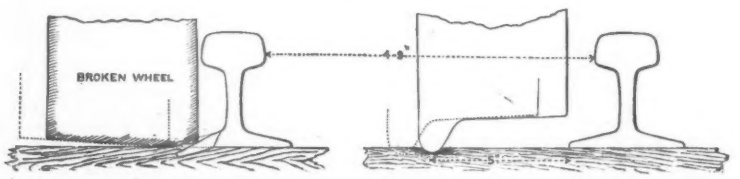



Fig. 2.

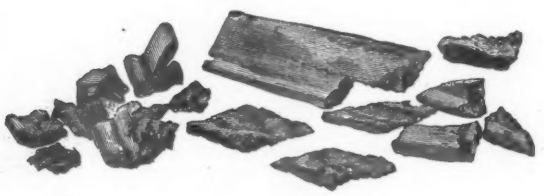


Fig. 5.

Fig. 3.

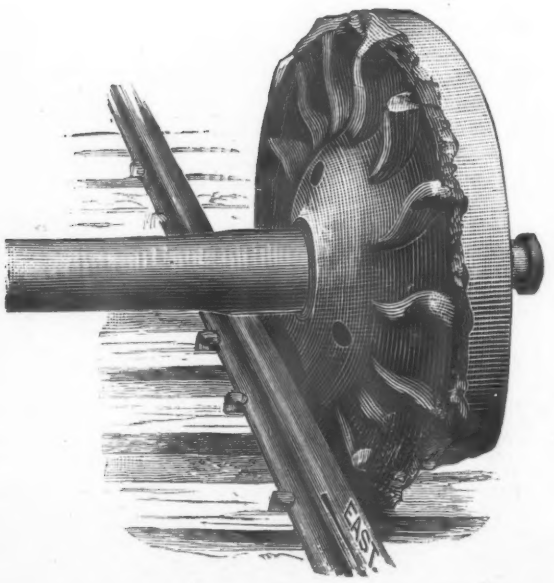



Fig 4.

locomotive and car spring, medal of first class: spiral locomotive and car spring, medal of first class; car seat spring, medal of first class.

Knoxville Car Wheel Co., Knoxville, Tenn., steam railway car wheels, medal of second-class.

Lobdell Car Wheel Co., Wilmington, Del., steam railway car wheels, medal of first-class; street railway car wheels, medal of first-class.

Valerie Mabille, Belgium, display of buffers, springs and other products for railway use, medal of first-class.

R. L. Robertson, Jr., New Orleans, street car truck, honorable mention.

Société des Forces de la Providence, Belgium, iron and laminated steel rolled car wheels, medal of first class.

Société John Cockerill, Seraing, Belgium, springs for locomotive cars, honorable mention; forged iron wheels, medal of first class.

MISCELLANEOUS.

John Allen, Little Rock, Ark., for commendable skill of a colored man in constructing, unaided, a working model of an American locomotive, medal of first class.

Anderson Railway Appliance Co., Minneapolis, Minn., patent valve cover, medal of first class: valve motion on double engine, medal of first class; patent ash-pan, honorable mention.

Cambria Iron Co., Johnstown, Pa., railway joints and fastenings, medal of first class.

Cambria Iron Co., Johnstown, Pa., steel railroad rails, medal of first class; street steel rails, medal of first class; switches and curves, honorable mention.

Carlisle Manufacturing Co., Carlisle, Pa.—Key spring frog, medal of first class; clamp frog, medal of first class.

Cowell Platform Coupling Co., Cleveland, O.—Automatic coupler, medal of first class; automatic buffer, medal of first class.

Charles K. Hall, New Orleans—Car fare register, honorable mention.

A. & V. Halot, Lorraine, Belgium—Best railway portable track, medal of first class; ore cars, trucks or dumps, medal of second class.

National Iron & Brass Works, Dubuque, Iowa—Locomotive bell ringer, medal of first class.

R. H. Ramsay, Philadelphia—Apparatus for transfer of cars from broad to narrow gauge, medal of first class.

C. & O. Sandburg, London, England—Display of railway templets, honorable mention.

J. D. & W. C. Schooley, Braddock, Pa.—Fog signals and track torpedoes, medal of first class.

J. B. Slawson, New York—Street car fare boxes and attachment, medal of first class.

Société Anonyme de la Fabrique de Boulons de la Blanchisserie, Belgium—Rivets, bolts, etc., medal of first class.

Steam Gauge & Lantern Co., Rochester, N. Y.—Locomotive headlights, medal of first class.

Western Wheel Scraper Co., Mt. Pleasant, Iowa—Wheel scraper, medal of first class.

Wetzer Railway Signal Co., Philadelphia—Railway signal track lanterns, medal of first class.

## A Remarkable Accident.

The engravings herewith illustrate an accident, perhaps unique of its kind, which occurred on the Chicago, St. Louis & Pittsburgh Railway between mile-posts 81 and 73 (Piqua), between 3 and 4 a. m. of Feb. 26, 1885. The ninth car from the engine in a train of 32 eight-wheel cars (16 loaded box cars next the engine and 16 empty box and gondola cars following) broke a wheel at mile-post 81. The accident was not discovered until the train had run *eight* (7.80) *miles* and stopped at Piqua, when the conductor found the broken wheel *on the rail*. Figs. 3 and 4 show the condition of the wheel when discovered (except that it was on the track), 77 per cent. of the flange and 30 per cent. of the tread having been lost, and mainly broken off in detail, as shown by the small pieces in fig. 5, which are among those found scattered along the track for a distance of two miles.

The broken wheel was a *rear* wheel of the rear truck, and was of the best quality, as is evident enough from the engravings, to which facts, it would seem, must be ascribed the strangest part of the accident, which was as follows:

The front axle did not, so far as known, leave the rails at all, and the derailed wheel ran for the entire distance of 7.8 miles in the position shown in figs. 1 and 2, on or very near to the outside bottom flange of the rail, striking and marking almost every one in its passage, as will appear from the following detailed statement of the injuries to rails:

| | Pieces. | Rails. | Total. | P. c. |
|---|---|---|---|---|
| Rails with pieces broken out | 3 | 7 | | |
| " " " " " | 2 | 43 | | |
| " " " " " | 1 | 85 | | |
| | | | 135 | 10 |
| | Blows. | | | |
| Rails receiving hard blows | 4 | 1 | | |
| " " " " | 3 | 199 | | |
| " " " " | 2 | 221 | | |
| " " " " | 1 | 150 | | |
| | | | 571 | 41 |
| Rails receiving light blows | 3 | 79 | | |
| " " " " | 2 | 118 | | |
| " " " " | 1 | 2 | | |
| | | | 199 | 15 |
| Rails showing no hard blow on rail | | | 475 | 34 |
| Total number of rails | | | 1,380 | 100 |

Not all these latter rails escaped injury, however. Among them there have been since several broken rails. The wheel striking the head of the spikes and driving them down against the rails seems to have injured them so as to cause breakage. A large number of them also show very light blows or scraping in connection with these injuries from the spikes.

The pieces broken out were some of them from 5 to 7 in. long. Some of the indentations had beat the flange down ¾ in.

No one of the rails was immediately broken so as to be unserviceable, it would appear, but within five days 47 broke under traffic, distributed somewhat curiously, as follows:

| | |
|---|---|
| First day | 6 rails. |
| Second day | 12 " |
| Third day | 7 " |
| Fourth day | 9 " |
| Fifth day | 13 " |
| Total | 47 " |

The speed of all trains was, of course, reduced over the damaged section until it could be relaid with new steel, which was done at once, 370 tons of rail being required, the old steel being used for repairs in yards and sidings.

The trainmen were, on investigation, acquitted of all blame. The engineer noticed nothing unusual in the pulling of the train and had looked back over the train at each of the five curves, two of which were to the right and three to the left. Six switches were also passed over and slightly damaged. The conductor was on top of the rear of the train for the last two miles. For the first four and last two miles, the head brakeman was on top of the first five cars, and the rear brakeman was on the last eight or nine cars for the entire distance, but the noise of the blows was not heard by any of them.

The broken wheel was of Altoona (Pennsylvania Railroad) make, and had been in service 5 years and 4 months. The opposite one in the same axle was made by the Barney & Smith Manufacturing Co.

The speed of the train was slow, 50 minutes having been consumed in running ten miles, including one intermediate stop at a crossing after the wheel had broken. The grades were, 36 ft. per mile descending, 34 ft. per mile ascending, level (for about three miles) and 44 ft. per mile *descending* for the last two miles run.

We are indebted to the Chicago *Railway Review* for figs. 3-5 of the engravings illustrating this extraordinary accident, which is further discussed in another column.

For the remainder of the engravings and for the full report of the accident from which the above account is condensed we are indebted to Mr. J. F. Miller, Superintendent.

# Contributions.

## Defective Bridge Foundations.

NEW YORK, May 15, 1885.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It may be unkind, but is none the less instructive, to call to mind the fact that the Chestnut street bridge is not the first one on the Schuylkill whose weakness has been prescribed for upon an erroneous diagnosis. The Connecting Railroad bridge, when its western abutment began to lean toward the river, was treated to a dose of iron arches in combination with the trusses of the main span, in the hope that they might counteract the supposed thrust of the (semi-circular) arches of the masonry approach, confidence in the theory upon which the calculations for the size of the piers had been founded not being complete. But when this remedy proved inadequate, it was decided to place a mass of masonry in front of the erring abutment which could withstand any thrust, *practical* as well as *theoretical*. But when they came to dig down to get a foundation for the new mass, what do you think they found? They found that the grillage underlying the original abutment, instead of resting all around upon the bed rock of the river, rested upon it only on the back edge, and that the front edge rested only upon a few large boulders, which were gradually crushing their way into the timber, and slowly but surely undermining the abutment, so that practice and not theory proved to be at fault, after all.

The original edition of Trautwine seems to have been a victim of this want of confidence in theory, for it ascribes the failure entirely to the thrust of the arches, the article having been written before the real difficulty was discovered.

* *

## Evaporating Performance, Norfolk & Western Engine Tests.

PITTSBURGH, May 16, 1885.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the table of engine and coal tests on the Norfolk & Western and Shenandoah Valley railroads in your issue of May 15, and especially to the statement: "The higher efficiency of engine 44, Shenandoah Valley, over 121, Norfolk & Western, is attributable to the different conditions of the roads. The trains on the Shenandoah Valley are limited by a few heavy, but short grades, while the rest of the road is very easy running. On the Norfolk & Western it is one succession of hard pulls, the fire having to be forced for a great part of the distance." The figures in the test, however, show that, instead of the Norfolk & Western boiler being forced, the Shenandoah Valley boiler evaporated 30,100 lbs. more water than the Norfolk & Western boiler, although it also did 22,760 ton-miles more work. Figuring the water evaporated per ton-mile, which is the best method of determining the work done by the boilers for proper comparison, we find that the Shenandoah Valley consolidation freight engine's boiler evaporated from and at 212° Fahr. 2.03 lbs. of water per ton-mile, while the Norfolk & Western engine's boiler evaporated 2.046 lbs. of water per ton-mile, or a difference of only about 0.8 of one per cent. Forcing a boiler 1 per cent. will not make a difference of 25 per cent. in its economy. The writer believes that there must have been some error in the test of engine 44, Shenandoah Valley, as the evaporation is far above anything heretofore obtained in this class of boiler (on reliable tests), being about 75 per cent. of theoretical evaporation. The error may be partly due to priming, also to firing, and probably also to the suggestion found in Note 1 of the author's, or to all these conditions combined.

WM. F. ZIMMERMANN.

[Mr. Zimmerman seems to have failed to note that the evaporation given is not the actual, but the equivalent *from and at* 212° *Fahr.*, which, assuming the temperature of the water to have been about 62° F., increases the evaporation by about one-fifth, the two standing about in the ratio of 5 to 6, or, more exactly, 965 to 1,160. This brings down the *actual* evaporation from the "equivalent" of 10.05 to 8.37 lbs. of water per pound of coal; and if this be further corrected for coal burned in firing up and "during any long lay-over," and some moderate allowance made for possible excess of priming, it is not clear why there should necessarily be any large error in the statement. The method used above of drawing deductions from the average evaporation per ton-mile is also open to criticism. If one of a pair of boilers was drawn upon uniformly for 650 lbs. of steam per mile, and another on each alternate mile or five or ten miles for 1,300 lbs. and *nothing*, there would be no difference at all in the average evaporation per mile; but would there, therefore, be no difference in fuel economy?—EDITOR RAILROAD GAZETTE.]

## A French System of Coal Premiums.

CONSTANTINE, Algeria, Africa, April 15, 1885.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have always been astonished to see American engineers, so experienced in everything, not having universally adopted the "premium system" for fuel and oil consumption in locomotives.

Is it not, perhaps, because it had not been adopted in England? Nevertheless, as results have always been very good, I think it will be interesting for your readers to give them some brief indications on the organization of such a system.

The first operation is to determine the weight of fuel necessary to haul a given distance:

1st. The engine and tender;

2d. One ton of train;

both being taken at the mean speed of trains.

This determination must be made experimentally, as in practice the allowance of fuel varies with the quality of the coal, the type of locomotive, the profile of track, and other conditions.

This established, all fuel is weighed before loading on tenders, engineers giving printed tickets, signed opposite the weight of fuel or oil delivered.

A "consumption record of fuel" is opened the first of each month, for each engine, and an employé registers every day lighting, hours of reserve, hours of switching, train mileage and weights of fuel and oil delivered.

FORM NO. 1.

| MONTH. .... ..... 188.. Fuel Ticket. Baskets of 50 kilos. | MONTH .....188.. Oil Ticket. Kilos. |
|---|---|
| 10 .... .... ..... | 1 ... ..... ..... |
| 20 .... ..... ..... .. | 2 ..... |
| 30 ..... ..... | 3 ..... |
| 40 ... ..... ..... | 5 ..... ..... |
| 50 ..... .... | 10 ..... ... |
| | 20 ..... ..... |

Switching, mileage, the number of minutes gained or lost on schedule time, are given by the "traction ticket" where the conductor registers tonnage between each two stations, etc., etc.

At the end of the month a balance is struck between fuel and oil allowed for mileage and tonnage hauled and fuel and oil actually expended. Any saving is divided between the engineman, the fireman, and the company. Generally $\frac{4}{12}$ goes to the driver, $\frac{2}{12}$ to the fireman, and $\frac{6}{12}$ to the company.

The foreman of a round-house receives the average premium of drivers under his orders.

The classification of engines according to fuel consumption gives some very useful statistics.

FORM NO. 2.

Depot at .....

Traction Ticket.

Train No..... Conductor..... Name of { engineer..... fireman.....

..... data .....

| Name of stations..... | Schedule time..... | Real time..... | Tonnage..... | No. of cars..... | Switchings..... |
|---|---|---|---|---|---|
| | | | | | |

| | Engine. | Train service. | Stations. |
|---|---|---|---|
| Time lost by... .. ..... .... . ..... . | | | |
| Ditto gained... ..... ..... . ..... | | | |

OBSERVATIONS.

(Signature). Conductor. (Signature). Engineer.

My company has 17 locomotives in service on 198 miles of road. The engines have six wheels, all coupled, 60 in. or 52 in. diameter. The engines weigh 37 tons, and haul trains weighing (cars and lading) on an average 140 tons (of 2,205 lbs.) at a speed of 25 miles an hour. The grades are 1½ per cent., or 80 ft. per mile. The curves are 1,000 ft. radius.

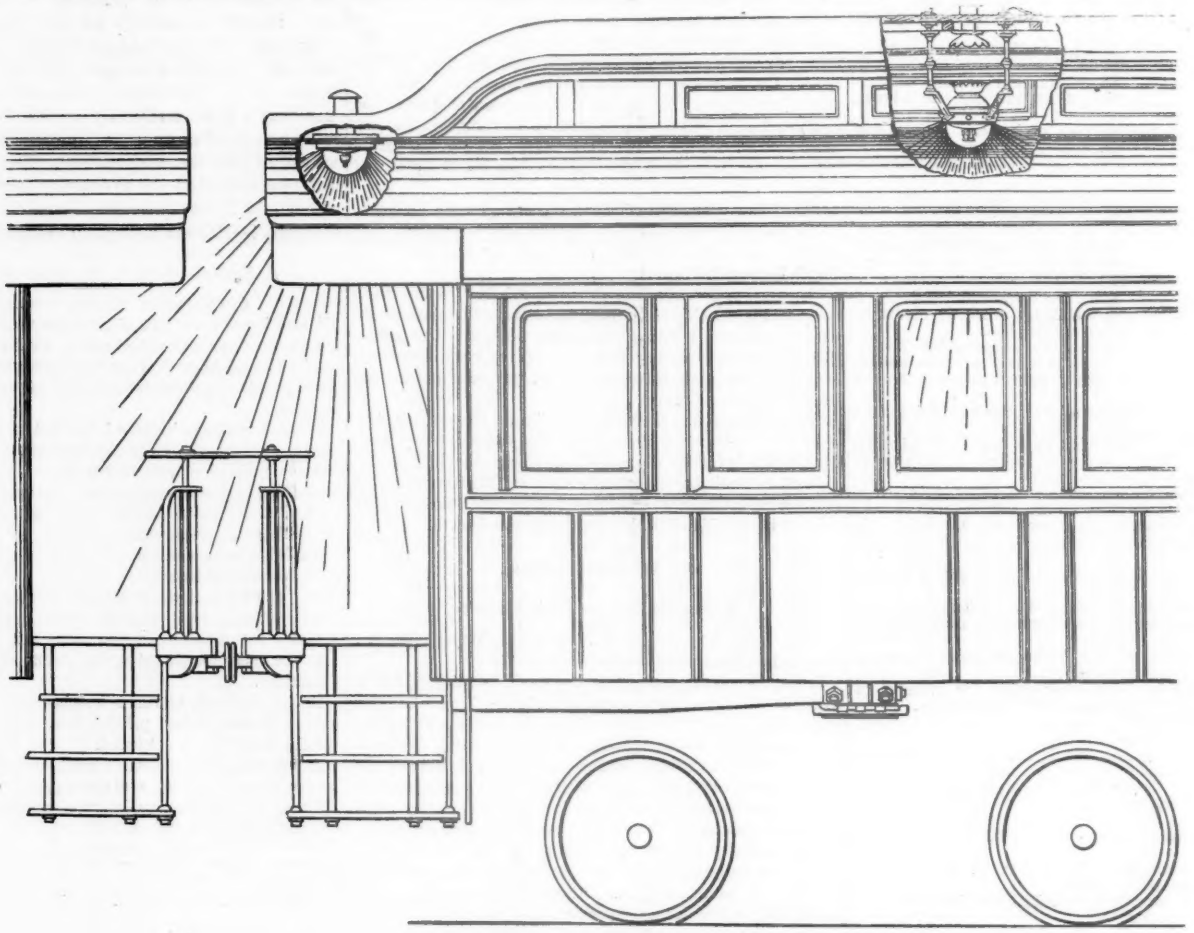
| | | |
|---|---|---|
| Heating surface of fire-box | | 81 sq. ft. |
| " " " tubes | 1,255 | " |
| Grate area | 15 | " |

The fuel is very good compressed briks, or artificial fuel, made from South Wales coal in Cardiff. It costs $8.50 per ton loaded on tender.

Allowances are as under:

| | Kilogrammes per kilometre. | Lbs. per mile. |
|---|---|---|
| Fuel: engine and tender | 5.000 | 17.700 |
| " each ton of train, summer | 0.035 | 0.124 |
| " " " winter | 0.040 | 0.142 |
| " lighting up | 150 kilogrammes = | 333 lbs. |
| Standing per hour | 6 kilo. = | 13 lbs. |
| Oil | 0.025 | 0.080 |

Running about 2,700 miles per month, a good driver re



THE PINTSCH CAR PLATFORM LAMP.

ceives $15 to $16 premiums, corresponding to an economy of four or five tons of fuel, and 90 to 100 lbs. of oil.

A fuel premium of $2 per ton of coal saved is paid to the engineman, and $1 to the fireman, and 4 and 2 cents respectively for each pound of oil. The company's corresponding profit is about $25 to $30.

When the train is late, or behind schedule time, the engineman receives 2 cents for each minute gained with a passenger train, and 1 cent for a goods (freight) train. The engineman on the other hand pays 3 cents for each minute lost with a passenger train, and 2 cents for each minute lost with a goods train. Great saving of money can be made by this system, which does not present the slightest difficulty.

A. GRILLE,
Assistant Inspector of Locomotives on Railways of Eastern Algeria.

## Pintsch's Car Platform Lamp.

The accompanying illustration represents a platform lamp which has been lately introduced by the Pintsch Lighting Company. It is constructed to burn the special quality of gas made by this company and is on the same principle as its regular car lamps, and is free from shadows and unaffected by draughts. The flame is protected by a glass globe, and above it is a white porcelain-enameled reflector designed to distribute the light evenly over the platforms. These platform lamps are being used on cars of the New York, Providence & Boston, and on the New York, Lake Erie & Western. The lamp seems likely to be a great convenience, especially on trains making frequent stops. In getting on and off cars at country stations accidents not infrequently occur which would be avoided were the car platforms and steps better lighted.

## English Self-Propelling Wrecking Derrick.

The wrecking derrick shown, copied from an engraving which appears in *The Engineer*, differs strikingly in most of its details from ordinary American practice. Even its English name, "locomotive breakdown steam crane," is different; a name which seems intended quietly to imply that in England a train *breaks down*, but never gives out altogether, by getting completely wrecked.

The crane shown was built for the Taff Vale Railway, by Messrs. Alex. Chaplin & Co., engineers. It is designed for general use in locomotive yards as well as for "break-down" purposes, and is one of the most powerful cranes of the class yet made, being capable of lifting loads up to 20 tons at a radius of 12 ft., or up to 12 tons at a radius of 18 ft., the height of the jib above the rails being 20 feet at the latter radius. The hoisting gear is single and double purchase, being arranged thus for lifting lighter loads at increased speed. The full load is lifted by a return block and two falls of chain. The gearing for all the four motions of (1) hoisting or lowering the loads; (2) slewing entirely round in either direction, simultaneously with hoisting or lowering when desired; (3) adjusting or altering the radius of jib; and (4) propelling the crane along the rails, is worked from the engine, which has a pair of cylinders 7 in. diameter, 12 in. stroke, with link-motion reversing gear. The framing which carries the engine, gearing and boiler is entirely built of wrought iron plates and angles, as is likewise the jib, which is curved to give more head-room in lifting bulky articles. The boiler is of the vertical class, having cross-tubes in the fire-box, and tested to double the working steam pressure.

## ANNUAL REPORTS.

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## Chicago, Rock Island & Pacific.

The usual preliminary statement published by this company gives the following summary for the year ending March 31, for three years past:

| | 1884-85. | 1883-84. | 1883-84. |
|---|---|---|---|
| Earnings | $12,206,900 | $12,535,515 | $12,189,903 |
| Expenses | 7,160,300 | 7,298,002 | 7,199,817 |
| Net earnings | $5,046,600 | $5,237,513 | $5,080,086 |
| Fixed charges | 1,594,600 | 1,481,256 | 1,401,958 |
| Balance | $3,452,000 | $3,756,257 | $3,678,128 |
| Land Department | 330 000 | 470,000 | 560,000 |
| Total | $3,782,000 | $4,226 257 | $4,238,128 |
| Dividends | 2,937,186 | 2,937,186 | 2,937,186 |
| Surplus | $844,814 | $1,289,071 | $1,300,942 |

Taxes are included in expenses. Last year shows a decrease of $328,615 (2.6 per cent.) in gross earnings and of $190,913 (3.7 per cent.) in net earnings. The dividends were 7 per cent. in each year.

## Concord.

This company owns a line from Nashua, N. H., to Concord, 35 miles; the Hooksett Branch, 7 miles; the Epping Branch, 1 mile, and the Manchester & North Weare road, 19 miles. It leases the Suncook Valley road, 20.5 miles, and the Concord & Portsmouth road, 40.5 miles, making 62 miles owned and 123 worked. The company also owns the Nashua, Acton & Boston road, 20 miles, but that road has been operated by the Boston & Lowell Co. since July 1, 1884. It owns one-half share in the Manchester & Keene road, 29 miles, that road being also operated by the Boston & Lowell. The report is for the year ending March 31.

The equipment consists of 39 locomotives; 43 passenger, 7 combination and 12 baggage cars; 4 milk, 388 box, 3 stock, 462 flat, 175 long coal, 146 dump and 10 caboose cars; 1 pay car, 8 service cars and 3 snow-plows.

The general account, condensed, is as follows:

| | | |
|---|---|---|
| Stock | | $1,560,000 |
| Deterioration and contingent account | | 111,496 |
| Sundry accounts, interest, rentals, etc | | 200,114 |
| May dividend | | 75 000 |
| Notes payable | | 50 000 |
| Cashier Concord R. R. | | 117,048 |
| Total | | $2,059,658 |
| Construction | $1,500,000 | |
| Rindge's Wharf, Portsmouth | 51,508 | |
| Manchester & Keene | 160,518 | |
| Suncook Valley | 61,168 | |
| Nashua, Acton & Boston | 30 000 | |
| Sundry accounts | 13,357 | |
| Materials | 157,760 | |
| Cash | 85,347 | |
| | | $2,059,658 |

The company has no funded debt. The bills payable were given on account of the purchase of the Manchester & Keene road.

The traffic for the year was as follows:

| *Train miles:* | 1884-85. | 1883-84. | Inc. or Dec. | P. c. |
|---|---|---|---|---|
| Passenger | 257,697 | 256,799 | I. 898 | 0.3 |
| Freight | 299,334 | 312,088 | D. 12,754 | 4.1 |
| Service and switching | 259,241 | 246,928 | I. 12,313 | 5 0 |
| Total | 816,272 | 8 5 815 | I. 457 | 0.1 |
| Passengers carried | 648,409 | 693,851 | D. 45 442 | 6 5 |
| Passenger miles | 15,694,352 | 15 954,688 | D. 259,736 | 1.6 |
| Tons freight carried | 1,114,143 | 1,116,519 | D. 2,376 | 0.2 |
| Ton-miles | 36,077,453 | 36,088,257 | D. 10,803 | . . |
| *Av. train load:* | | | | |
| Passengers, No. | 61 | 62 | D. 1 | 1.6 |
| Freight, tons | 121 | 113 | I. 5 | 4.3 |

Through business last year furnished 33.6 per cent. of the passenger-miles and 64.7 per cent. of the ton-miles.

The earnings for the year were:

| | 1884-85. | 1883-84 | Inc or Dec. | P.c. |
|---|---|---|---|---|
| Freight | $673,606 | $703,276 | D. $29,670 | 4.2 |
| Passengers | 378.415 | 390.619 | D. 12.204 | 3.1 |
| Mail and express | 31.674 | 31 727 | D. 53 | 0.2 |
| Rents, etc | 17,169 | 17,272 | D. 103 | 0.6 |
| Total | $1,100,864 | $1,142.894 | D. $42.030 | 3.7 |
| Expenses | 694,484 | 664,704 | I. 27,780 | 4.2 |
| Net earnings | $406 380 | $476,190 | D. $69,810 | 14.7 |
| Gross earn. per mile | 8.601 | 7,992 | I. 609 | 7 9 |
| Net " " " | 3.175 | 3,330 | D. 155 | 4.7 |
| Per cent. of exps | 63.1 | 58.3 | I. 4.8 | .. |

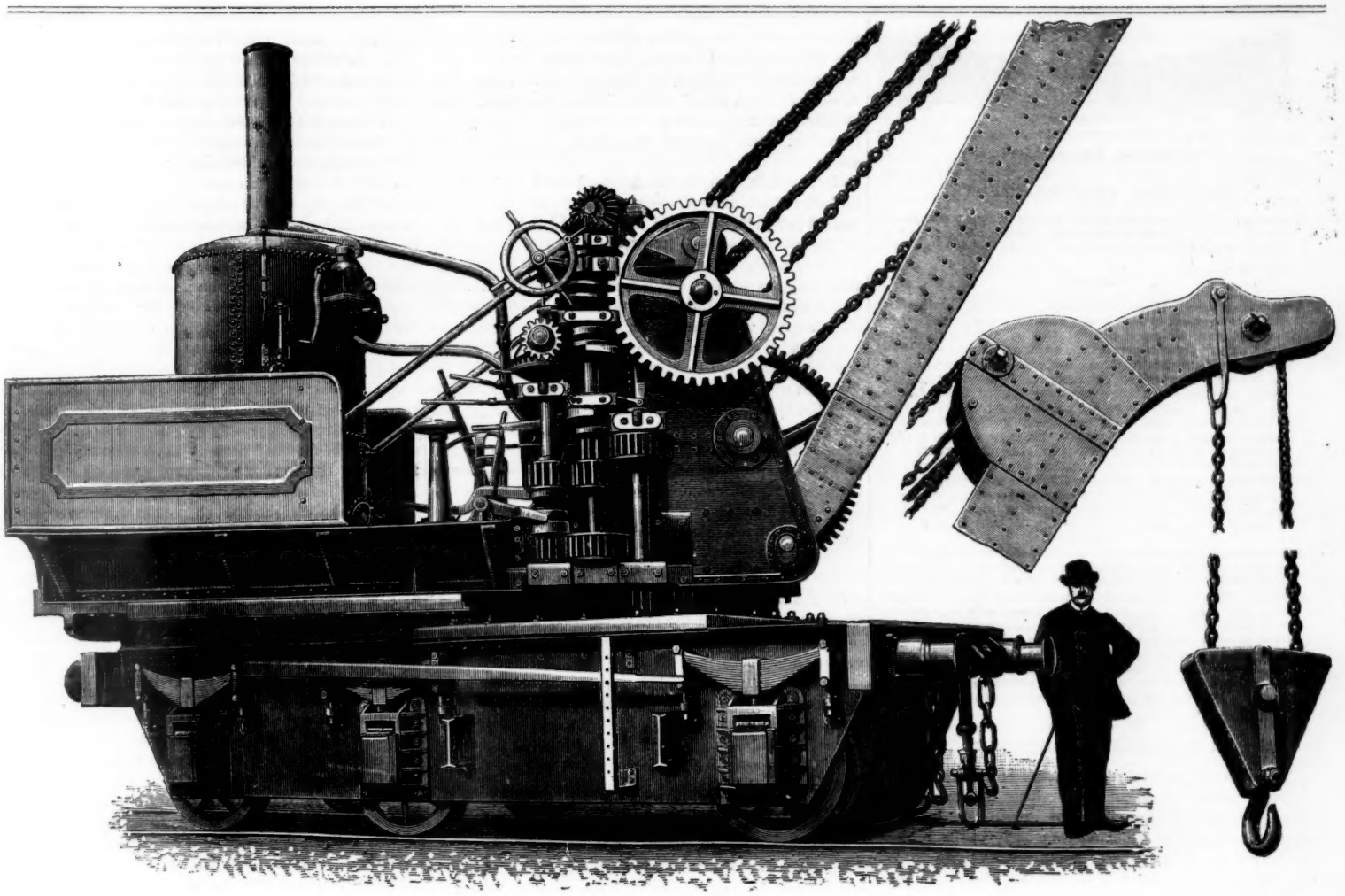
All renewals and ordinary improvements are included in expenses, only actual additions to property being charged to income account.

The result of the year was as follows:

| | | |
|---|---|---|
| Net earnings, as above | | $406,380 |
| Tax on capital stock | $37.755 | |
| Manchester & Lawrence | 54 883 | |
| Manchester & Keene | 6,8 6 | |
| Rentals paid | 51,600 | |
| Improvements and new equipment | 84.091 | |
| Contingent and unsettled claims | 20,000 | |
| Dividends, 10 per cent | 150,000 | |
| | | 405,165 |
| Balance, to contingent fund | | $1,215 |

The usual semi-annual dividends of 5 per cent. each were paid last year.

One new locomotive has been built in the shops and two others contracted for. Two passenger, one baggage, 27 freight cars and one snow-plow have been added to the equipment. Renewals included 1,050 tons of steel rails (67-lb.) and 62,414 new ties. The 56-lb. steel rails replaced in the main line have been laid on branches. There were 4,913 ft new sidings laid. A new iron bridge has been built over the Nashua River. The new station at Concord has been nearly



ENGLISH SELF-PROPELLING WRECKING DERRICK.

finished, and plans have been prepared for a new building at Manchester.

The joint ownership of the Manchester & Keene road has proved unprofitable, chiefly on account of the large sum required to put it in good order. The road is operated by the Boston & Lowell Co., this company receiving a small percentage of earnings as rental. Losses arising from its operation are included in expenses.

## Utah Central.

This company, which was formed by the consolidation of the Utah Central, the Utah Southern and the Utah Southern Extension, owns a line from Ogden, Utah, through Salt Lake City and Juab to Frisco, 280 miles. It is controlled by the Union Pacific. The following statements are from the reports presented at the recent annual meeting, and are for the year 1884.

The stock and debt are:

| | |
|---|---|
| Stock ($15 089 per mile) | $4,225.000 |
| Funded debt ($17.500 per mile) | 4,900.000 |
| Floating debt ($642 per mile) | 179.892 |
| Total ($33,231 per mile) | $9,304,892 |

The funded debt includes $1,000,000 Utah Central 6s, $1,950,000 Utah Southern 7s and $1,950,000 Utah Southern Extension 7s. The interest charge is $333,000 yearly.

The passengers and freight carried were:

| | 1884. | 1883. | Decrease. | P c. |
|---|---|---|---|---|
| Passengers | 169,824 | 212,452 | 42,628 | 20.9 |
| Tons freight | 363,759 | 389,607 | 25,848 | 6.6 |

The decrease in traffic was due partly to general depression of business and partly to the competition of the Denver & Rio Grande road. The same causes resulted in a considerable decrease in earnings.

The earnings for the year were:

| | 1884. | 1883. | Inc. or Dec | P. c. |
|---|---|---|---|---|
| Freight | $768,597 | $861,049 | D. $92,452 | 10.7 |
| Passengers | 211,770 | 272,858 | D. 61,088 | 22.4 |
| Mail, etc | 81,654 | 58,579 | I. 23.075 | 39.1 |
| Total | $1,062,021 | $1,192,486 | D. $130.465 | 10.9 |
| Expenses | 578,589 | 594.780 | D. 16,191 | 2.7 |
| Net earnings | $483,432 | $597,706 | D. $114.274 | 19.1 |
| Gross earn. per mile | 3,793 | 4,259 | D. 466 | 10.6 |
| Net " " | 1.727 | 2.135 | D. 408 | 19 1 |
| Per cent. of exp | 54.5 | 49.9 | I. 4.6 | .. |

Taxes are included in expenses, which also include all ordinary renewals.

The result of the year was as follows:

| | | |
|---|---|---|
| Net earnings, as above | | $483,432 |
| Interest on bonds | $333,000 | |
| Permanent improvements | 31,342 | |
| Dividends, 2 per cent | 84,500 | |
| | | 448,842 |
| Surplus for the year | | $34,590 |

The report says: "In expenses there was a slight increase in the item of taxes, and an increase in the maintenance of way of $2,636. This increase was caused by the renewal of ties, 40,000 of which were put into the track during the year, together with 180 tons of rails. Everything has been done consistent with economy to reduce our operating expenses, yet they have not decreased proportionately with the decrease of our gross earnings. This is accounted for by the fact that while we have had less traffic in the passenger department, the opposition and competition of the rival company has compelled us to run more trains and at greater speed than we have heretofore done.

"The business outlook is not very promising at present. We have, however, entered into a pool contract with the Denver & Rio Grande Co. to maintain rates, and run trains in such a manner that will be most economical to the two companies, consistent with a fair service to the public. We hope by this agreement to reduce our operating expenses to some extent. There has been a serious cave in the Horn Silver mine. It has been shut down since Feb. 18, but we hope for a resumption of shipments in a few weeks from this date. It is well known that the southern portion of our road is very largely dependent on this mine."

## Georgia Railroad.

This road includes a main line from Augusta, Ga., to Atlanta, 171 miles, with branches from Barnett to Washington, 18 miles; Union Point to Athens, 40 miles; Camak to Macon, 78 miles—a total of 307 miles. The road is leased to the Central Railroad Co., of Georgia, and the Louisville & Nashville Railroad Co., as joint assignees of Wm. M. Wadley, and is operated by a General Manager for their joint account. The report is for the year ending March 31.

The equipment consists of 44 locomotives; 29 passenger, 6 sleeping, 4 combination, 3 postal and 10 baggage and mail cars; 479 box, 152 Green Line box, 28 stock, 168 flat, 113 coal and 19 caboose cars; 1 pay car, 3 commissary and 20 shanty cars.

Additions made last year were 2 locomotives, 4 passenger cars and 25 box cars.

The traffic statements given are as follows:

| *Train-miles:* | 1884-85. | 1883-84. | Inc. or Dec. | P c. |
|---|---|---|---|---|
| Passenger | 308,393 | 306.761 | I. 1,632 | 0.5 |
| Freight and mixed | 872,576 | 800,188 | I. 72,388 | 9.0 |
| Service and switching | 193,669 | 202,811 | D. 9,142 | 4.5 |
| Total | 1,374,638 | 1,309,760 | I. 64,878 | 4.9 |
| Bales cotton carried | 269,211 | 260.207 | I. 9,004 | 3.5 |
| Bushels grain | 3,160,022 | 2,505.796 | I. 654,226 | 26.1 |
| Barrels flour | 259,943 | 231,246 | I. 28.697 | 12.4 |
| Tons guano | 74,251 | 67,293 | I. 9,958 | 10.4 |
| Total tons freight | 417,705 | 397,733 | I. 19,972 | 5.0 |
| Ton-miles | 56,132,771 | 53,230,838 | I. 2,901,933 | 5.5 |
| Av. train load, tons | 64 | 67 | D. 3 | 4.5 |
| Av. rate per ton-mile | 1.62 cts. | 1.75 cts. | D. 0.13 ct. | 7.4 |

Of the ton-miles last year 78.1 per centwere from connecting roads, and 21.9 per cent. from local stations.

The earnings for the year were:

| | 1884-85. | 1883-84. | Inc. or Dec. | P.c. |
|---|---|---|---|---|
| Freight | $857,203 | $876.763 | D. $19,560 | 2.2 |
| Passage | 379,439 | 394,319 | D. 14,880 | 3 8 |
| Mail and express | 49,843 | 53,165 | D. 3,322 | 6.3 |
| Total | $1,286 485 | $1,324,247 | D. $37,762 | 2 9 |
| Expenses | 820,240 | 846,702 | D. 26,462 | 3.1 |
| Net earnings | $466,245 | $477,545 | D. $11,300 | 2.4 |
| Gross earn. per mile | 4,191 | 4,314 | D. 123 | 2.9 |
| Net " " " | 1.519 | 1,556 | D. 37 | 2 4 |
| Per cent. of exps | 63.76 | 63.94 | D. 0.18 | ... |

Expenses include taxes, which were $45,050 last year. They also include $85,378 extraordinary expenditures, for new buildings, new ballast and other improvements of road and additions to rolling stock.

The result to the lessees was as follows:

| | | |
|---|---|---|
| Net earnings, as above | | $466,245 |
| Dividends, Atlanta & West Point | | 52,908 |
| " Western Railroad of Alabama | | 37,500 |
| Interest Walton Railroad | | 1,860 |
| Total | | $558,513 |
| Rental paid | $600,000 | |
| Advances to Gainesville, Jefferson & So | 90,954 | |
| | | 690.954 |
| Payments in excess of income | | $132,441 |

The advances to the Gainesville, Jefferson & Southern, which is a new controlled connecting line, included $32,248 for expenses and interest, $33,843 balance from previous year and $24,863 for new construction and equipment. The business of this line is improving and it is expected that it will pay its way before long.

Renewals on the Georgia road included 363 tons of steel rails and 124,128 new ties. The main line is now all in steel, and about 1,000 tons yearly will meet necessary renewals on the branches. The track, bridges and buildings have been well maintained and the work of ballasting with broken stone continued.

The report refers at length to the decrease in earnings on an increased traffic, mainly caused by the reduction in rates compelled by the Georgia Railroad Commission. The Georgia Supreme Court has affirmed the right of the Commission to control rates over this road. An appeal to the United States Supreme Court has been taken, but the road remains under the control of the Commission pending the hearing of this appeal.

## Northern (New Hampshire).

This company owns a line from Concord, N. H., northwest to White River Junction, Vt., 69.5 miles, with a branch from Franklin, N. H., to Bristol, 13.5 miles, making 83 miles in all. The report is for the year ending March 31, for ten months of which, from June 1, 1884, the road has been leased to the Boston & Lowell Co.

The company has $3,068,400 stock and no funded debt. The report does not give the operations of the road, which will be included in the lessee's statement. The income account is as follows:

| | | |
|---|---|---|
| Earnings, April and May, 1884 | | $75,948 |
| Rental, 10 months | | 127.850 |
| Balance of interest account | | 55,991 |
| Balance, March 31, 1884 | | 229,859 |
| Total | | $484,648 |
| Expenses, March and April, 1884 | $72,128 | |
| Appropriated to improvement account | 100,169 | |
| Dividends paid, 6 per cent | 179,838 | |
| | | 352,135 |
| Balance, March 31, 1885 | | $132,513 |

The lease of the road was executed to the Boston & Lowel under vote of the stockholders June 18, 1884, a copy of the agreement being annexed to the report. Soon after the execution of the covenants two suits were instituted by stockholders, one to break the lease and the other to secure a division of the surplus, both of which are still pending. The directors do not deem it for the interest of the stockholders to divide the entire surplus until the lease is declared valid by the courts or ratified by the legislatures of Massachusetts and New Hampshire. The company has no direct funded debt, but is liable as guarantor upon $299,500 of $500,000 bonds issued by the Concord & Claremont road, interest upon and renewal of all of which are assumed by the Boston & Lowell Co. in the lease. There are sundry claims against it, some of which are in litigation, including those of the Ogdensburg & Lake Champlain Railroad and the Receivers and Managers of the Vermont Central and Vermont & Canada railroads, the validity of which is denied by this company. The directors close their report as follows:

"In the litigation with reference to a division of the surplus of the company, it has been claimed by the parties seeking such division that certain irregularities existed in relation to the sale of stock of the Sullivan County Railroad owned by this company and sold in 1880. Testimony is being taken upon this matter, and is now unfinished. The late President, who is in Europe, has been requested by the board to return and testify, the board endeavoring to ascertain whether any irregularity in fact existed, and, when the testimony is completed, it is their purpose to take such action as the interests of the stockholders may require."

RAILROAD GAZETTE

Published Every Friday.

## EDITORIAL ANNOUNCEMENTS.

**Passes.**—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

**Contributions.**—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

**Advertisements.**—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

## A REMARKABLE ACCIDENT.

The accident illustrated in another column, in which a broken wheel ran eight miles off the track, not only doing no further damage, but apparently doing its best to avoid it by adhering as closely to the outside of the rail as if there were a guard rail outside of it, if not entirely unprecedented, is certainly a very rare occurrence, and it is of interest to consider what combination of causes made it possible.

One cause which is immediately evident from the engravings is that the broken wheel was of particularly good quality. In the distance which it ran while off the track it made nearly 4,800 revolutions, in nearly all of which it must have been subjected to one or two violent blows. Of these blows, 1,860 left their record on the rail, and these need not necessarily include all of considerable violence. An inferior wheel, it is reasonable to suppose, would have broken completely under this usage, with, of course, immediate derailment. Instead of this, the wheel in question, after the first fracture, lost no other large pieces at all, although the tremendous pounding to which it was subjected broke off 70 per cent. of the flange in successive small pieces. A better proof of the value of sound and good car wheels, outside of the mere money value of the extra mileage duty, could hardly be desired.

The next most important cause for preventing derailment of the car will be generally admitted to be, for obvious reasons, that it was a rear wheel instead of a front one. To this fact, combined with good quality of wheel, slow speed, good track, and above all *good luck*, is doubtless largely to be ascribed the strange immunity from disaster, for had the broken wheel been a front one, it hardly admits of doubt that complete derailment would almost immediately have followed, at least on striking the nearest curve of the three passed over turning away from the broken wheel. As it was, the rear wheels, even when off the track on a curve, tended to track behind the front wheels, confirming the results of experiments which indicate that they so track in all cases in service, not bearing with their own flange against either rail.

A further cause which would seem to have been an efficient one, and perhaps essential to safety, was the simple fact that the broken wheel dropped on the outside instead of the inside of the rail.

Binding of side-bearings, which immediately suggests itself, would be hardly likely to continue effective for eight miles in the face of excessive and persistent jolting; but the combination of all the other circumstances which have been mentioned is sufficiently unusual, and from the combined effect of them all, granting derailment of the rear wheels to have once occurred without derailing the front wheels, we can readily see that there were five different forces continually acting, *all* tending to prevent further slewing, and only *one* irregular and intermittent cause, the rough jolting and jarring, acting against them. These causes were:

(1) The front wheel on the opposite side to the broken wheel would by its natural path be crowded hard against the rail and ride on the inner angle of the flange, thus considerably increasing its diameter and giving it a tendency to run ahead and straighten the track. Calculation indicates that this force might be equivalent to one of 1,200 to 1,800 lbs., acting directly on the axles.

(2) The unbroken derailed wheel (and indeed the broken wheel also) from the skew of the truck, tended to run back *toward* the rail which it had left, at the rate of 4 to 6 in. in 5 ft., or ¼ to 1 in. in the width of a tie. Whenever the wheels failed to do this they must have been slidden sidewise on the tie, and as the ties were sound and close together they would exert a great resistance to such side motion, amounting probably to at least as much as the first cause.

(3) The car-body being thrown at the draw-head some 3 in. out of line, the natural draft of the train, which near the head of the train was considerable, would tend to restrain the trucks. With draw-bars fitting snugly this 3 in. would all be concentrated in the length of a (probably) 10 in. link, so that if we assume the average pull on the draw-bar to have been, on the up-grades, 8,000 lbs., the lateral force tending to hold the derailed car in place would have been:

| | | |
|---|---|---|
| At the draw-head, about | | 2,530 lbs. |
| " " centre-pin, " | $\frac{5}{8}$ of 2,530 = | 3,160 lbs. |
| " " derailed axle, " | ½ of 3,160 = | 1,580 lbs. |

On the down-grade this force would not have acted. On the contrary, had the brakes not been efficient on the rear of the train, its effect would have been reversed, in so far as it acted at all.

(4) The heads of the spikes, coming at such frequent intervals, might well help considerably, by their inward bevel, the action of other forces which were naturally tending to hold the wheel close to the rail.

(5) The impacts of the *broken* wheel against the ties and spikes, which would naturally be more violent than those of the opposite wheel, would also have a greater leverage (as is clear from fig. 1), and would tend to straighten the truck, while the impacts of the other wheel, which tend to skew the truck further, would both be less violent and have less leverage. They would also come a little *after* the impacts tending to straighten the truck.

Had the broken wheel been a front instead of a rear wheel, the first two causes and the last would have tended plainly to make a bad matter worse instead of better. Had the broken wheel fallen inside instead of outside the rail, the last cause would again have been against stability, and being the most violent and irregular of all, we may well believe that it might alone have sufficed to cause a speedy catastrophe. The third and fourth counteracting causes, comparatively slight at best, would in either of these cases have had little chance to come into play at all. To the fortunate fact that *all* the forces normally acting, although all of them were more or less lawless and irregular, yet when they acted at all *acted together* to reinforce and not destroy each other, should be ascribed, apparently, the surprising result. Their united effect was that there was a force constant in direction, but varying in magnitude from 1,500 to 4,000 or even 6,000 lbs, in addition to and coinciding with the lawless effect of frequent impacts, constantly tending to straighten the truck.

A moral might, perhaps, well be drawn from this singular accident, in which a happy and rare combination of natural causes kept the wheels from slewing more than 4 in. out of line in all, or 2 in. out of line with the centre-line of the car, to enforce what has been recently said in these columns (Feb. 27), on the subject of check-chains. It is plain that we cannot always expect a broken wheel to be a front wheel, nor when it breaks to have it drop outside instead of inside the rail, nor the rear of the train to be always well braked on down grades, nor the ties and road-bed to be solid and in good order. Any cause, however, which will *directly* restrain a truck from skewing more than 2 or 3 in. may reasonably be expected, not in all cases, but in some cases, to serve as well as we have seen all these natural causes together may, to prevent greater disaster, since we see from this example that the mere jolting and thumping in such cases may do no harm in long distances if there be some efficient cause acting to restrain further skewing.

## THE MAXIMUM EFFICIENCY OF BRAKES.

To interpret correctly how near to a feasible standard of excellence a given brake approaches it is desirable first to determine as a basis of comparison, (1) the utmost efficiency which experiment has shown to be possible from any form of brakes, and (2) the extent to which this efficiency has been approached in practice by the best recorded stops. It cannot be, of course, by any means assumed that a *freight* brake must equal or approach this record to be worthy of adoption; many other conditions—simplicity, economy, durability and adaptation to the practical conditions under which a freight brake must be introduced—are certainly important and possibly controlling conditions; but the percentage of maximum efficiency secured is clearly an important element needing to be determined, if not a decisive or controlling one.

The best stops ever made by brakes in actual service, there can be little doubt, were those made in the famous Galton-Westinghouse brake tests in England in 1876-79 with an experimental brake van which had been fitted up with delicate apparatus for determining every question connected with the efficiency of brakes. The contest between the various forms of brake-gear was at that time hot in England, and to that fact we owe a series of elaborate and delicate tests, conducted in the main under the supervision of Captain Douglas Galton, which, as we declared at the time, were "unequaled in brilliancy in the whole history of railroad engineering." It is not too much to say that they added more to our knowledge of the theory of the action of brakes than all which had been done before or has been done since put together. In the brake van referred to, an automatic record was made by appropriate and ingenious apparatus of (1) speed of train, (2) pressure on brake-blocks, (3) friction of brake-block or pull on hangers, (4) tractive resistance of van and various other details.*

From the automatic record diagrams obtained with this apparatus the table below (Table I.) of *coefficients of friction* or ratios of the retarding force to the pressure was determined, from which it appears that the retarding force, with the same pressure, is immensely affected by the speed, and with the same speed and pressure by the length of time the brake is applied, the retarding friction falling very rapidly within the first few seconds after application, while the pressure remains the same. On the other hand, it was found that substantially the same retarding force was required *at all speeds* to skid the wheels.

The natural deduction was plain that for maximum efficiency the pressure should be very great at high speeds, and decrease with the speed. Mr. Westinghouse devised a method to accomplish this by an attachment which, in effect, weighed the actual tangential retarding force of the brake-block directly, and whenever it exceeded a fixed amount (between one-fourth and one-fifth of the load on the wheels) reduced the air pressure and so prevented skidding, thus insuring a *constant* retarding force at all speeds just within that required to skid the wheels. This device was tested on the experimental van only, the stops being made by cutting it loose from the train, and with it the remarkable and wholly unprecedented stops shown in Table II. were accomplished, which were hailed with enthusiasm by the leading technical journals as (in the words of one of them) "going far to demonstrate that Mr. Westinghouse has introduced an improvement in the construction of railway brakes which will almost double their value."†

These hopeful expectations were not realized. For reasons which in part are evident below, the attachment has never come into practical use, even to a limited extent; yet, in spite of that fact, the experimental results attained from it are most instructive. They show clearly that (1) a retarding force somewhat exceeding one-fourth of the load on the wheel is in all cases necessary to skid the wheel, with a clean rail, and that this force can be actually realized through entire stops at the highest speeds by sufficiently elaborate mechanism. They show also (2) that on the one hand, with all the care possible, with the most delicate apparatus and with the most perfect brake-gear, it is not possible to make brakes act twice alike, while on the other hand the average of a number of tests may fairly be expected, with sufficient care, to correspond closely. In these particular tests, in which there were only two axles braked, the efficiency varied between the extremities of 14.47 and 25.28 per cent., equal to a difference of 74 per cent. (as 100 to 174) in distance run, although all essential facts were recorded automatically, leaving no room for errors of observation; and although (as we may safely assume) the brakes were, so far as skill and care would make them, in perfect order. The brake-shoes, in fact, had been turned so as to give a more perfect fit to the wheels.

Experiments of perhaps more practical value, as showing the best that could be done under ordinary conditions with stops of entire trains in the routine of daily operation, had been made some two years before on the North British Railway, where two trains of very nearly equal weight, one fitted up with the West-

* See *Railroad Gazette*, 1878-9, especially Feb. 21, 1879, page 99.

† The manner of computing Table II., and all the following tables, III. to V., from the records of the stops, was explained in our issue of May 15, "The Computation of the Efficiency of Brakes," and need not be again referred to.

TABLE I.

*Sliding Friction of Brake Shoes on Steel Tires and Steel Tires on Steel Rails.*

(Capt. Douglas Galton's Deductions from Record Diagrams.)

| Speed. Miles per hour. | Coefficient, or Percentage of the Pressure. Cast-iron Brake-Shoes on Steel Tires. On application. | After 5 secs. | After 10 secs. | After 15 secs. | After 20 secs. | Steel Tires sliding on Steel Rails. |
|---|---|---|---|---|---|---|
| 1 to 2 | .250 | .... | .... | .... | .... | .242 |
| 7+ | .242 | .... | .... | .... | .... | .088 |
| 13+ | .213 | .193 | .... | .... | .. . | .072 |
| 17 | .205 | .157 | .... | .110 | .... | .... |
| 20+ | .182 | .152 | .133 | .116 | .099 | .... |
| 27+ | .171 | .130 | .119 | .081 | .072 | .070 |
| 30+ | .163 | .107 | .099 | .... | .... | .... |
| 34 | .153 | .... | .... | .... | . .. | .065 |
| 37+ | .152 | .096 | .083 | .069 | .... | .... |
| 40+ | .144 | .093 | .... | .... | .... | .057 |
| 47+ | .132 | .080 | .070 | .... | .... | .... |
| 54+ | .106 | .... | .... | .045 | .... | .038 |
| 60 | .072 | .063 | .058 | .... | .... | .027 |

Pressure necessary to skid a revolving wheel :—uniform at all speeds at about one-fourth or 0.25 of the load.

Friction at velocity of O+, or at instant of coming to rest, rises frequently to 0.30 or 0.325 of the pressure.

For copies of original record diagrams, see *Railroad Gazette*, Feb 21, 1879; *Engineering* and *The Engineer*, Jan. 31, 1879; or Dredge's *Pennsylvania Railroad*. Appendix B.

TABLE II.

*Stops made on London, Brighton & South Coast Railway with Westinghouse Experimental Brake Van, giving the Highest recorded Efficiency of Brakes.*

| Speed, miles per hour | Grade, 100 feet per 100 | Time, secs. | Distance, ft. | Vel. Head | Grade of Ret'n, ft. per 100 | Do. including actual grade | Loss 1.0 p. c. (20 lbs. per ton) Roll'g Friction. | Av'ge velocity during stop, ft. p. sec. Theoretical (½ initial). | Actual. | Diff. of Actual |
|---|---|---|---|---|---|---|---|---|---|---|
| 45 | Level | .. | 288 | 71.89 | 24.9 | 24.9 | 23.9 | .... | .... | .... |
| 53 | " | 13 | 513 | 99.72 | 19.4 | 19.4 | 18.4 | 38.75 | 39.5 | + 0.75 |
| 60 | + .379 | 12¾ | 513 | 127.80 | 24.8 | 24.42 | 23 42 | 44. | 40.4 | − 3.6 |
| 60 | + .322 | 12¼ | 501 | 127 80 | 25.5 | 25.18 | 24.18 | 44. | 41.0 | − 3.0 |
| 55 | Level | 13 | 585 | 107.39 | 18.3 | 18 3 | 17.3 | 40.2 | 45 0 | + 4.8 |
| 60 | " | 14¼ | 642 | 127.80 | 19.9 | 19.9 | 18.9 | 44. | 45.1 | + 1.1 |
| | Average of first six tests..... . | | | | | | 21.02 | 42.19 | 42.20 | + 0.05 |
| 57 | + .379 | 15½ | 618 | 115.34 | 18 7 | 18.32 | 17.32 | 41.8 | 39 9 | − 1.9 |
| 55 | − .379 | 13 | 513 | 107.39 | 20.8 | 21.18 | 20.18 | 40.2 | 39.5 | − 0.1 |
| 55 | + .303 | 10½ | 423 | 107.39 | 25.4 | 25.10 | 24.10 | 40.2 | 40.3 | + 0.1 |
| 62 | − .379 | .. | 528 | 136.46 | 25.9 | 26 28 | 25.28 | .... | .... | ..... |
| 54 | − .274 | 18 | 681 | 103.52 | 15 2 | 15.47 | 14.47 | 38.5 | 37.9 | − 0.6 |
| 57 | − .246 | 18½ | 669 | 115.34 | 17.3 | 17.55 | 16.55 | 41.8 | 36.2 | − 5.6 |
| | Average of second six tests..... | | | | | | 19.65 | 40.5 | 38.76 | − 1.74 |
| | Average of all twelve tests..... | | | | | | 20.33 | 41.35 | 40.48 | − 0.87 |

Variations in single tests, from 28.6 per cent. *below* to 24.3 per cent. *above* the average.

For references to records in full, see note to Table I.

TABLE III.

*Westinghouse-Smith Brake Tests—North British Railway—Average Efficiency of Brakes for Entire Stop. (Level Grade.)*

*Westinghouse Train* (86.55 per cent. braked).

Weight of train, braked 187.85 (net) tons, unbraked 29.16 tons; total 217.01 tons.

Weight of engine only 30.67 (net) tons, unbraked 17.00 tons; total 147.67 tons.

| Test No. | Speed. m. p. h | Distance run, ft. | Vel. Head. | Equivalent grade of retardation. Gross. | Net. | | Actual efficiency of brakes. |
|---|---|---|---|---|---|---|---|
| 3 | 30.0 | 328 | 31.95 | 9.75 | 9.45 | | 10.94 |
| 5 | 40.0 | 550 | 56 80 | 10.30 | 9.90 | | 11.46 |
| 4 | 40.0 | 550 | 56.80 | 10.30 | 9.90 | | 11.46 |
| 6 | 49.75 | 798 | 87.87 | 11.00 | 10.40 | | 12.00 |
| 7 | 50.0 | 777 | 88.75 | 11 42 | 10.82 | | 12.50 |
| 12 | 54.0 | 952 | 103.52 | 10.88 | 10.18 | | 11.75 |
| 10 | 55.0 | 910 | 107 39 | 11.81 | 11.11 | | 12.83 |
| | Average | | | | | | 11.85 |

Stops made against full power of engine working at usual high-speed point of cut-off (estimating energy at 48 lbs. per ton of train = 2. 4 p. c. grade).

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13 | 56 | 1,172 | 111.33 | 9.50 | .7 | } + 8.80 } + 2.4 | 12.95 |
| 14 | 54 | 1,158 | 103.52 | 8.85 | .7 | } + 8.15 } + 2 4 | 12.2 |

*Smith Train* (86.02 per cent. braked).

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | 29.5 | 480 | 30.90 | 6.44 | .3 | 6.14 | 7.15 |
| 5 | 40. | 740 | 56.80 | 7.69 | .4 | 7.29 | 7.48 |
| 6 | 40. | 860 | 56.80 | 6.67 | .4 | 7.21 | 8.39 |
| 14 | 40 | 810 | 56.80 | 7.02 | .4 | 6.62 | 7.70 |
| 15 | 49.5 | 1,250 | 87.00 | 6.96 | .6 | 6.36 | 7.40 |
| 7 | 49.5 | 1,175 | 87.00 | 7.41 | .6 | 6 81 | 7.93 |
| 9 | 49.5 | 1,195 | 87.00 | 7.28 | .6 | 6.68 | 7.77 |
| 13 | 54. | 1,310 | 103.52 | 7.91 | .7 | 7.21 | 8.39 |
| 14 | 55. | 1,375 | 107.39 | 7.81 | .7 | 7.11 | 8.28 |
| | Average .. ..... ... ..... ..... | | | | | | 7.94 |

The allowance for rolling friction of train above is a minimum, so that the last column represents a maximum for the work done by the brakes.

For Original Record of these stops, see *Engineering*, Jan. 5, 1877, or Dredge's *Pennsylvania Railroad*, Appendix B.

TABLE IV.

*Westinghouse and Smith Brake Tests—Efficiency of Brakes per cent. in each successive Hundred Feet (excepting the last fraction of 100 ft. at end of stop, given in the following table).*

The table gives (except in the last lines) the combined retarding effect of the brakes and rolling friction of train in per cent. of an equivalent retarding grade, *i. e.*, in per cent. of retarding forces to total weight of train.

WESTINGHOUSE TRAIN (86.55 PER CENT. BRAKED).

| Test No. | Average Speed in Miles per Hour. 20 | 28 | 35 | 40 | 44 | 47.5 | 50 | 52.5 | 55 |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 11.19 | 11.15 | 3.61 | ..... | ..... | ..... | ..... | ..... | ..... |
| 5 | 12.84 | 13.83 | 9 73 | 9.44 | 0.70 | ..... | ..... | ..... | ..... |
| 4 | 13 88 | 13.11 | 9 94 | 7.50 | 0.70 | ..... | ..... | ..... | ..... |
| 6 | 13.17 | 14.65 | 13.31 | 10.69 | 12.62 | 6.89 | 0.87 | ..... | ..... |
| 7 | 12.65 | 13.00 | 11.41 | 15.45 | 15.08 | 6.08 | 0.88 | ..... | ..... |
| 12 | 10.80 | 13.16 | 15.36 | 10.93 | 12.86 | 11.55 | 13 34 | 4.68 | 2.85 |
| 10 | 12.46 | 13.63 | 15.66 | 10.51 | 11.94 | 15.85 | 14.20 | 6.58 | 4 82 |
| Average ... | 12.42 | 13.23 | 12.57 | 11.90 | 13.12 | 13.70 | 13.77 | 5.13 | 3.83 |
| Less roll. fr.. | .40 | .50 | .65 | .75 | .80 | .90 | 1.00 | | |
| Net average.. | 12.02 | 12.72 | 11 92 | 11.15 | 12.32 | 12.80 | 12.77 | | |
| Do +.8655.. | **13.9** | **14.7** | **13.75** | **12.9** | **14.2** | **14.8** | **14.75** | | |

Stops made against full power of engine working at usual high speed point of cut-off. (Estimated energy, 48 lbs. per ton, = 2.4 p. c. grade.)

| Test No. | Average Speed in Miles per Hour. 19 | 25.5 | 31 | 36 | 39.5 | 42.5 | 46 | 48 | 51 | 53 |
|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 7.91 | 9.55 | 14.54 | 8.38 | 9.82 | 10.74 | 10.76 | 11.51 | 8.51 | 6.72 |
| 14 | 10.23 | 11.66 | 8.65 | 11.76 | 7.54 | 9.92 | 10.05 | 8.47 | 10.75 | 5.63 |
| Aver.. | 9.07 | 10.61 | 11.60 | 10.07 | 8.72 | 10.33 | 10.40 | 9.99 | 8 63 | 6.17 |
| Roll. fric. | .4 | .5 | .55 | .70 | .75 | .80 | .85 | .90 | 1.00 | 1.10 |
| Net aver. | 8.67 | 10.11 | 11.05 | 9.37 | 7.97 | 9.53 | 9.55 | 9.09 | 7.63 | 5.07 |
| Work of eng..... | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 |
| Total.. | 11.17 | 12.51 | 13.45 | 11.77 | 10.37 | 11.97 | 11.95 | 11.49 | 10.03 | 7.47 |
| + .8655. | 12.9 | 14.5 | 15.55 | 13.6 | 11.95 | 13.85 | 13.8 | 13.3 | 11.6 | 8.65 |

SMITH TRAIN (86.02 PER CENT. BRAKED).

| Test No..... | Average speed in miles per hour. 18 | 26 | 31.5 | 36 | 40 | 43 | 46 | 48 | 50 | 52 | 53 5 | 54 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 8.33 | 7.64 | 4.15 | 0* | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 5 | 9.20 | 9.76 | 10.65 | 8.51 | 5.93 | 4.16 | 0.70 | ..... | ..... | ..... | ..... | ..... |
| 6 | 8 61 | 9.84 | 9.67 | 9.16 | 5.28 | 3.46 | 0 70 | 0.70 | ..... | ..... | ..... | ..... |
| 14 | 11.38 | 10.01 | 9.74 | 8.81 | 7.77 | 2.74 | 2.00 | 0.70 | ..... | ..... | ..... | ..... |
| 15 | 11 9 | 12.57 | 10 46 | 9 14 | 9.99 | 8 48 | 6.50 | 4.19 | 2.59 | 1.74 | 0 88 | 0 |
| 7 | 10.70 | 9.75 | 11.54 | 9.82 | 9.3 | 6.11 | 9.69 | 4.13 | 2.69 | 0.88 | 0.88 | ..... |
| 9 | 9.80 | 10.12 | 9.37 | 9.14 | 10.74 | 6.15 | 8.08 | 4 19 | 2.59 | 1.74 | 0.88 | ..... |
| 13 | 10.22 | 11.98 | 11.88 | 10.31 | 9 44 | 9.84 | 10.09 | 7.57 | 9.74 | 3.68 | 3.74 | 1.900 |
| 14 | 11.32 | 19.83 | 10.46 | 8.45 | 10.68 | 9.27 | 8.21 | 8.66 | 7.24 | 3.73 | 3.80 | 2.890 |
| | 83.15 | 84.76 | 83.77 | 74.84 | 56.17 | 39.85 | 42.48 | 16.22 | 16.98 | ..... | ..... | ..... |

| | 18 | 26 | 31.5 | 36 | 40 | 43 | 46 | 48 | 50 |
|---|---|---|---|---|---|---|---|---|---|
| Average..... | 10.40 | 10.65 | 10.47 | 9.26 | 10 03 | 7 97 | 8.50 | 8.11 | 8.49 |
| Less roll. fr.... | .4 | .45 | .6 | .7 | .75 | .80 | .85 | .90 | 1.00 |
| Net average.... | 10.00 | 10.15 | 9.87 | 8.56 | 9 28 | 7.17 | 7.65 | 7.21 | 7.49 |
| +.8002..... | **11.6** | **11.8** | **11.45** | **9.95** | **10.75** | **8.35** | **8.9** | **8.4** | **8.7** |

Counting from the beginnings of the stops, the numbers read from *right* to *left*.

Numbers outside of the heavy black lines have been excluded from the averages.

*Summary*

Average net efficiency of brake friction only (last line of tables).

Westinghouse train, after first 100 ft.; average, 14.15 per cent.
" " against engine, after first 200 ft.; average, 13.68 per cent.

Smith train, after first 300 to 500 ft ; average, 10.00 per cent.
" " last 500 ft. of stops only, " 11.11 " "
" " preceding 400 ft. " 8.60 " "

TABLE V.

*Westinghouse and Smith Brake Tests—Efficiency of Brakes at End of Stops.*

Being over the closing portion (the fraction over the last even 100 ft. from the application of the brake) of the high-speed stops given in Tables III. and IV.

*Level Grade.*

WESTINGHOUSE TRAIN (86.55 PER CENT. BRAKED.)

| Initial speed entering on last 100 ft. | Distance run. | Vel. head. | Grade of retardation. Gross. | Net. | Actual efficiency of brakes. |
|---|---|---|---|---|---|
| m. p. h. | ft. | | | | |
| 21 | 98 | 15.67 | 16.00 | 15.60 | Previous col. + .8655. |
| 20 | 77 | 14.20 | 18.50 | 18.10 | |
| 17 | 50 | 10.26 | 20.52 | 20.12 | |
| 16.5 | 50 | 9.67 | 19.34 | 18.94 | |
| 18.60 | 69 | Averages..... | | 18.19 | 21.2 |
| 15. | 52 | 7.99 | 15.20 | 14.80 | |
| 13. | 28 | 6.00 | 21.40 | 21.00 | (Av. of all 20.9.) |
| 7. | 10 | 1.74 | 17.40 | 17.00 | |
| 8.3 | 30 | Averages..... | | 17.60 | 20.6 |

SMITH BRAKE (86.02 PER CENT. BRAKED).

| | | | | | |
|---|---|---|---|---|---|
| 20 | 95 | 14.20 | 14.95 | 14.55 | Previous col. + .8605. |
| 18 | 75 | 11.50 | 15.35 | 14.95 | |
| 17.5 | 80 | 10.88 | 13.60 | 13.20 | |
| 17.5 | 75 | 10.88 | 14 53 | 14.13 | |
| 18.25 | 81 | Averages ... .... | | 14.21 | 16.8 |
| 16.25 | 60 | 9.38 | 15.63 | 15.23 | |
| 15.5 | 50 | 8.54 | 17.08 | 16.48 | |
| 15. | 40 | 7.99 | 20.00 | 19.60 | (Av. of all 19.3.) |
| (10) | (10) | (3.55) | (35.50) | (35.10) | |
| 8. | 10 | 2.27 | 22.70 | 22.30 | |
| 13.70 | 40 | Averages..... | | 18.40 | 21.7 |

The test in parentheses is excluded from the average, containing some error probably due to a slight error of observation in reading the velocity.

inghouse automatic and one with the Smith vacuum brake, were very thoroughly tested with the accurate recording apparatus already referred to. By these records the diminution of speed and hence the efficiency of brakes on each successive fraction of the stop could be determined, thus revealing not only how much work was done by the brakes, but *where* it was done or was not done.

As these tests are and probably will long remain the best existing evidence as to the details of brake efficiency and as to its ultimate practical limit, we have analyzed them in detail, with somewhat greater fullness and in a somewhat different form from any which has been heretofore attempted in the accompanying Tables III., IV. and V., which show (1) the average efficiency of the brakes for the entire stop in each test and by averages, (2) the efficiency of the brakes on each successive 100 ft. of each test and by averages, and (3) the efficiency of the brakes on the last fraction of 100 ft. on which the speed had been reduced (see Table V.) to from 8 to 21 miles per hour.* We must, however, postpone to another issue, a summary of the conclusions to be drawn from them.

## The Recent Course of Immigration.

The season's immigration fairly begins in April, and it is larger this year than was to be expected, the arrivals in April having been :

| 1881. | 1882. | 1883. | 1884. | 1885. |
|---|---|---|---|---|
| 95,351 | 104,274 | 78,475 | 66,800 | 50,788 |

The decrease from last year is 25 per cent., from 1883 it is 35½ per cent., from 1882, 51½ per cent. The arrivals were a fifth more in April than for the entire three months previous, which has not happened before since 188¹. For the four months ending with April the arrivals have been :

| 1881. | 1882. | 1883. | 1884. | 1885. |
|---|---|---|---|---|
| 175,707 | 216,244 | 147,210 | 133,274 | 92,068 |

Thus the arrivals this year for the four months were 30 per cent. less than last year, 37 per cent. less than in 1883, and 57 per cent. less than in 1882.

The arrivals this year cannot be considered small, however. Before 1880 they were probably never equaled. If the arrivals in May and June should be similar, that is, one-fourth less than last year, the arrivals of the fiscal year ending with June will be about 379,000, which number was equaled before 1879-80 only three times—in 1870, 1872, and 1873. It is hardly to be expected that immigration will keep pace with the growth of this country, but rather with that of Europe, which is very much slower, so that if the same proportion of the European population should emigrate in 1885 as in 1875, it would not be a much larger number now than ten years ago, when, in fact, there were 227,498 immigrants.

The decrease from recent years is very large, however, and the prospect is that the number added to the population by immigration will be 400,000 less this year than in 1881-82. But the natural increase is so much larger than the immigration that it makes less difference with the total growth of the population than might be supposed. In 1881-82 the natural increase was about 1,036,500 and the immigration 789,000 ; this year the natural increase will be about 1,140,000 and the immigration 379,000. Thus the total increase in population will be about 1,514,000 this year, against 1,825,500 in 1881-82—only one-sixth less, though the immigration has fallen off more than one-half. The immigration this year will add about ¾ per cent. to the population, which alone would be a large growth in most European countries; but the natural increase of 2 per cent. is so much larger that the immigration is comparatively not a very important element in our growth.

Immigration is not exactly a gauge of the prosperity of this country, but rather of the difference between the prosperity of this and European countries—of the better chances of workingmen in this country. It is interesting, therefore, to compare the course of immigration during the present period of industrial depression with its course after 1873.

The arrivals since the war have been :

| Year. | Number. | Year. | Number. | Year. | Number. |
|---|---|---|---|---|---|
| 1866..... | 266.000 | 1873 ..... | 459,893 | 1880..... | 457.257 |
| 1867..... | 298,967 | 1874.... . | 313,339 | 1881..... | 669,431 |
| 1868.... .... | 282,189 | 1875..... | 227,498 | 1882 ..... | 788,992 |
| 1869..... | 352,768 | 1876..... | 169,986 | 1883..... | 599,114 |
| 1870..... | 387,203 | 1877 ..... | 141.857 | 1884..... | 509 834 |
| 1871..... | 321,350 | 1878 ..... | 138,469 | 1885 ..... | 379,000 |
| 1872..... | 404,806 | 1879..... | 177,826 | | |

The immigration after the war was comparatively steady for the eight years ending with 1873, during which 2,773,086 arrived. But it fell off rapidly after 1873, in 1875 being 50 per cent. and in 1877 70 per cent. less than in that year. In the five years from 1875 to 1879 inclusive the arrivals were only 855,636—less than in the two years 1872 and 1873. Then we come to the late period of heavy immigration, which started suddenly, the increase from 1879 to 1880 being 157 per

*The records of the ends of stops (Table V.) have never been analyzed at all heretofore. In *Engineering* of Jan. 5, 1877, appears a table (to which we are indebted for the notes from which Tables III. and IV. are prepared), giving the speed in miles per hour at each 100 ft. after application, and also what purports to be the "Retarding Power of Brakes in Pounds per Ton" on each 100 ft. The latter, however, is inaccurately described, in that what it really gives is the retarding power of the brakes and train friction *combined* upon the train *as a whole* and not simply upon the weight resting on braked wheels. Therefore, although answering well enough for the particular purpose then in view (comparison of two nearly equal trains), they are not suitable and liable to be deceptive for general purposes. The wheels in this table were found to add 8½ per cent. instead of 6.14 per cent. to the energy of the train, but the latter figure is probably more correct for American trains. Some other minor differences of computation exist, which in part are inexplicable, but nothing of serious moment.

cent. and amounting to 279,431. There had never before been anything like this, not even after the Irish famine. In the five years ending with June, 1884, 3,024,628 emigrants arrived, against 3,086,425 in the *nine* years after the war, from 1866 to 1874 inclusive. If we add the five lean years 1875-79 to the five fat years 1880-84, we have an aggregate of 3 880,264 immigrants for the ten years—an average of 388,026 per year, against an average of 342,936 for the previous nine years of uninterrupted heavy immigration. The current year thus seems likely to have something like the average of the previous ten years, which is 12 per cent. above the average of the nine years ending with 1874. This increase in the yearly average is greater, rather than less, than the increase in European population, doubtless. That we should have it this fiscal year, when we have thought our industrial condition so low, indicates that the country still offers greater attractions than Europe, where also business is bad and work harder to get than usual.

After the culmination of the first period of heavy immigration, in 1873, the arrivals fell off 32 per cent. in one year and 50 per cent. in two; after the culmination in 1882 the decline was 24 per cent. in one year and 36 per cent. in two. It has taken three years, from 1882 to 1885, for a percentage of decrease as great as from 1873 to 1875; and in three years after 1873 the decrease was 63 per cent., against 52½ in the last three years. This is like the general course of business in the two periods. The culmination of prosperity was in 1881 (the year ending June 30, 1881) and not 1882, and probably was in 1872 rather than 1873. Nearly all industrial production, however, was greater in 1882 than in 1881, and probably not greater in 1873 than in 1872. After four years' decline in prosperity we have attracted but about one-sixth less immigrants than at the culmination of the movement in 1873. Thus, as we said before, what is surprising is that immigration should be so large, not that it is so small. At the last year's rate the population of the country would increase 30 per cent. in 10 years, always providing that the natural increase continues to be 2 per cent. a year, as was indicated by the growth from 1870 to 1880. It certainly will not permanently continue to be so great. (It alone would make the growth 22 per cent. in ten years.) But we shall know only by future censuses when the rate begins to fall off.

### Chicago Shipments in April.

The complete report of the Chicago rail shipments eastward in the month of April, including freight of all kinds going as far east as Buffalo, Pittsburgh, or other western termini of the eastern trunk lines, shows them to have been greater than in any other month except last March, April of 1884, and probably January of 1882, and March of 1880, when some traffic now included was not reported. That is, last April was a month of extraordinarily large shipments.

For the last seven years the shipments in April by the complete reports have been:

| 1879. | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. |
|---|---|---|---|---|---|---|
| 298,042 | 189,276 | 270,184 | 141,640 | 159,147 | 357,873 | 344,667 |

The prevailing rate this year was 20 cents per 100 lbs. to New York, and probably not much freight was taken for less than this, except perhaps in the last few days of the month. Last year the regular open rate was 15 cents. That with the higher rate the shipments should have been but 4 per cent. less this year, shows that there was much more freight to move this year; but the stocks in the elevators show this still more plainly. Last year lake navigation was open one week in April; this year, not at all. Before 1884, the shipments of certain junction points which amount on the average to about 9 per cent. of the Chicago shipments were included, but allowing for these, the shipments were more than twice as great this year as in 1882 and 1883, a sixth more than in 1881, two-thirds more than in 1880, and 6 per cent. more than in 1879, when rates were quite as low as this year. In 1880 the rate was 35 cents till the 13th and then 30 cents; in 1881 it was 30 and 25 cents, with some cutting; in 1882 it was 25 cents, and in 1883 30 cents till the 18th and then 25. The *profit* on the business was less last year than this, but doubtless more in all other years except 1879, though the very light traffic made the profit very small in 1882 and 1883. The profit this year, however, must have been very small, especially as the great bulk of the freight was grain and flour, carried at the lowest rates.

The weekly reports of the flour, grain and provision shipments telegraphed from Chicago showed shipments in April amounting to 298,520 tons, or about one-seventh less than the above.

For the four months ending with April the complete reports show the Chicago shipments to have been, for the last seven years:

| Year. | Tons. | Year. | Tons. |
|---|---|---|---|
| 1879 | 948,533 | 1883 | 972,895 |
| 1880 | 845,807 | 1884 | 1,070,488 |
| 1881 | 968,193 | 1885 | 1,292,628 |
| 1882 | 868,525 | | |

Thus the shipments this year have been very much greater than ever before—20¾ per cent. more than last year, and (allowing for junction shipments) 22 per cent. more than 1883 or 1881, and 40 per cent. more than in 1880. It was in 1880 and 1881 that the business was most profitable, but it was also quite profitable in 1883. Rates averaged, perhaps, about the same this year as last, being higher in April, and probably lower in January and February.

Deducting the 30.3 per cent. of the traffic belonging to the three new roads, the five others had about 901,000 tons of freight this year against 921,000 in 1880; but their *profit* on the business then must have been about *three times* as great then as it was this year. Compared with 1881, the six roads which carried 1,055,000 then had about 1,124,000 this year; but their profit in 1881 was also about three times as great as this year. Assuming the freight to have been all grain and all to have gone to New York, the gross earnings were $6,119,000 in 1881 and $4,496,000 this year; and the net earnings something like $2,954,000 then and $1,124,000 now. These figures do not represent the actual net earnings very closely, and they somewhat exaggerate the percentage of decrease in them, as the figures for both years would be increased, and probably quite as much this year as in 1881, by the freight of the higher classes; but the amount of decrease, taking the lines through to the Atlantic, must have been something like what the above figures show, and this on the Chicago shipments alone.

Rates since April have fallen at least as low as they were last year, and there is no immediate prospect of an advance. But for the shipments of freight of the higher class, which are but a small proportion of the whole, there would probably be no profit at all on the business, and probably some of the lines are now carrying at a loss, as the newer roads usually (and some of the old ones) get but little of the high-class traffic. The rates on live stock and dressed beef are also greatly demoralized, but there possibly remains some profit on that business, which is costlier to carry than other freight. Under all circumstances it is hardly a matter for congratulation that there is a great deal of traffic to go forward. At a rate of 15 cents or less the railroads will probably carry much more to the East this season than they have ever done before. Manufacturers of rolling stock, wheels, rails, etc., will have larger orders in consequence, and trainmen more steady work, but the proprietors of the railroads seem unlikely to get any benefit whatever from it. There is only one consolation for them, that the less the profit or the greater the losses, the sooner this condition of things will cease; but as some of them are likely to have their property destroyed first, they cannot get much comfort even from that reflection.

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The meeting of the Central Traffic Association (western connections of the eastern trunk lines) in Chicago last week had little other result than to satisfy the members that nothing can be done at this time further than to make the arrangements necessary for success when the time shall be more favorable. There is not a little of such work to be done, and it can be done now, though doubtless there is not the same incentive to do it as if the advantage to be gained thereby would result immediately. There have been many joints in the armor by which east-bound rates were protected. The pools at the several western cities covered but a part of the traffic. Numerous junction points in Illinois, between Chicago and St. Louis, gave an opportunity for securing traffic outside of the pools. Several of the railroads west of Chicago have such junction points, where traffic consigned to trunk lines can be transferred and reach its destination without passing through Chicago, Peoria or any other pooling point. A very small reduction in the through rate, of course, suffices to divert the traffic to these routes, and the reduction gives the road west of Chicago an advantage over its rivals at the places where the shipments are made, so that the eastern road may get powerful aid in securing traffic through this joint in the pool armor, and the rates of the western, as well as the eastern, pools were threatened thereby. It has been urged repeatedly that the traffic from all points should be pooled to prevent such demoralization, but even at so important a place as Peoria there has been most of the time no effective pool.

The "Committee of Eighteen" of the Central Traffic Association last week voted that, notwithstanding the present obstacles to an effective arrangement, the pools at the several Western cities should be maintained and if necessary reorganized, and a special committee was appointed to re-establish the Chicago pool, which is to include not only Chicago and the near-by junction points heretofore included with it, but also Milwaukee and the junction points with the Rock Island at Seneca, the Chicago, Burlington & Quincy at Streator, and the Chicago & Alton at Dwight and Gardner. The organization of such a pool, of several pools covering these places, is almost indispensable to the maintenance of east bound rates, and if such a one is organized, the work of restoring and maintaining rates through a new organization, when that is practicable, will be very much aided thereby. There is at present, however, a serious obstacle to the making of a Chicago pool. The Chicago & Atlantic has recently given running rights over its road into Chicago to the Wabash. The Wabash receives the freight at its own station and carries it on its own trains, and the Chicago & Atlantic insists that in any new pool the Wabash shall be recognized as a Chicago line to the East. The other roads, so far, refuse to do this; they hold that each Chicago road must be held responsible for and report all the traffic from the city that passes over its line; and they claim that to recognize the Wabash as a Chicago line would open the way to the establishment of a large number of additional lines from Chicago to the East.

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The settlement of their difficulties made last week by the Chicago-Council Bluffs and Chicago-St. Paul roads is by a contract for two years, which provides for the division of the different traffics in dispute, by arbitration if not by mutual agreement. These questions have troubled the peace of the roads more or less for a long time, and it seemed as if they could not agree upon a basis for a settlement; but the arrangement now made seems likely to be carried out, and if so it will be of great advantage to all the roads concerned. It is true that the rates were not always spoiled by the contests over the business in question, but they often were, always were liable to be, and for some time before the settlement were especially profitless.

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The through shipments of freight from New York in April were only 3 per cent. less than last year, and were about 10 per cent. more than in 1883, and more than in any other year except 1882, when, with first-class freight carried at 25 cents per 100 (half the present rate), the shipments were one-half greater than in any other year. That the shipments should be so large this year compared with last year, is doubtless, to some extent, due to the reduction of nearly one-third in the rates. For the four months ending with April the shipments this year have been about 6½ per cent. less than last year, but for the last two months the decrease has been but 1½ per cent. April shipments are usually less than March shipments, and sometimes considerably less—5 per cent. less in 1879, 14 in 1880, 6½ in 1881, 3½ in 1882, 15½ in 1883, but they were the same in both months last year, and but 2½ per cent. less in April this year. They usually fall off still more after April; but this year the low rail rates tend to make the canal shipments smaller than usual, and for the first third of May the shipments were at the April rate. There is nothing to complain of in the amount of the traffic. Recently there has been some undue eagerness to obtain shipments, which might have made rates even lower than they are, but generally rates are maintained except by the weaker lines, which find it next to impossible to get high-class freight on any terms, but take a considerable share of the low-class freight by making reductions, which are not much objected to by the strong lines.

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The statistics collected by Mr. James M. Swank, for the American Iron and Steel Association, show that in the production of pig iron in the United States last year there were consumed:

| | |
|---|---|
| Domestic iron ore | 7,213,764 tons. |
| Foreign iron ore | 439,183 " |
| Total ore | 7,652,947 tons. |
| Anthracite coal | 1,543,688 " |
| Bituminous coal | 326,986 " |
| Coke | 3,697,275 " |
| Total coal and coke | 5,567,949 " |
| Charcoal | 5,057,715 bushels. |

In other iron works, the consumption was:

| | |
|---|---|
| Ore in bloomaries | 120,000 tons. |
| Ore in rolling mills | 354,454 " |
| Total ore | 474,454 " |
| Anthracite coal | 429,617 " |
| Bituminous coal | 3,900,000 " |
| Coke | 135,895 " |
| Total coal and coke | 4,465,512 tons. |
| Charcoal | 11,533,507 bushels. |

The aggregate consumption of fuel by American iron works was therefore:

| Anthracite coal. | Bituminous coal. | Coke. | Charcoal. |
|---|---|---|---|
| 1,973,305 tons. | 4,226,986 tons. | 3,833,170 tons | 62,110,660 tons. |

There is so much said of the effect of the decline in the iron industry on the demand for anthracite coal that probably most people will be astonished to see that of the whole production of about 30,000,000 tons last year less than 2,000,000 were consumed in iron works. Doubtless much more is consumed in manufactories which consume finished iron, and others, and the decline in their activity, which is one of the chief causes of the decline in the demand for iron, has had a greater effect on the demand for anthracite coal than the reduction in iron production.

It is also noticeable that more than four times as much bituminous as of anthracite coal is consumed in iron-making, though we hear little said of the depression in bituminous coal interests caused by the smaller iron production. The fact is, that the ownership of the anthracite mines by great railroad companies, in the stocks of which there is much speculation, causes everything that affects them to be talked of in the newspapers vastly more than its real importance deserves.

## Multiple Tracks on Curves and Sags in Grade Lines

A correspondent has sent us a discussion of this subject, which seems to be founded in part upon a misapprehension of the facts. He cites an instance on a prominent line in which five parallel tracks on a curve of about 6 degrees are raised one above the other, so that, despite the elevation rail given to track, the tops of the whole ten rails are brought approximately into a single plane surface, instead of having a sort of saw-like cross section, as he justly concludes would be necessary if the grade of each track were to be kept exactly alike by having the centre-line of each upon the same level. The width of road-bed for the five tracks being about 60 ft., this brings the upper edge about three feet higher than the lower. Thus, allowing for the tracks not being in a perfect plane, any one track is liable to be a foot or even 2 ft. above or below the grade.

But the conclusion which this correspondent proceeds to draw, that the hauling capacity of the line must thereby be diminished, is not necessarily justified. It must, in the first place, be on a maximum grade or very near a stopping-place to have any particular harm done. It must in the second place be well up towards the top of a maximum grade, or at least a mile or more from the foot of it. Otherwise the train will still have velocity enough to "float" over it by giving up for the moment a portion of its velocity which it immediately recovers again on passing the curve. If moving at the rate of 15 miles per hour, for example, a "hog-back" in the grade of 3 ft. total rise above the grade line would only reduce the velocity from 15 miles per hour to about 11½ miles per hour and even if the velocity were only 10 miles per hour, the velocity would only be checked down to 3 miles per hour. In either case this velocity would be immediately given back again by the (comparative) descent upon the upper side of the "hog-back," so that the train would proceed thereafter with the same velocity as if the break of grade had not intervened.

On the other hand, if the velocity of approach were as little as 9 miles per hour, or even 9½ miles, instead of 10 miles, the train would be brought to a stop by such a break of grade, which indicates that at the top of a long grade the taking of such a liberty with the grade line would be inadmissible. Even in that case, however, the difficulty could be gotten over without serious injury, while still keeping the tops of all the ten rails in the same plane so that the outside rail of all would be nearly 3 ft. higher than the inner one. It would not, indeed, be admissible to raise the outside rail 3 ft., or even 3 ft., above the established grade line (for even one foot rise would bring a train moving at 5½ miles per hour to a stop), but it would be possible to drop the inner rail 3 ft. *below* the grade-line without any serious consequences whatever. The effect would be that if a train were approaching the sag at 10 miles per hour, its velocity would be increased for the moment, at the bottom of the sag, to a little less than 14 miles per hour, which velocity would be gradually given up again as the train rose out of the depression, until at the top of it the original velocity of 10 miles per hour would be resumed again. If the original velocity of approach were higher, the comparative effect of the depression would be less. Thus, if the original velocity were 15 or 20 miles per hour, the momentary accelleration would be to velocities of 17¾ or 22¼ miles per hour, respectively, while if the original velocity were 50 miles an hour, the temporary acceleration would be less than one mile per hour, or to 50.9 miles per hour only.

It is not of course asserted that such violent liberties with the grades would be expedient or wholly harmless, but simply that to have the outer and inner tracks considerably out of level is not so serious a matter as our correspondent seems to believe. If the change of grade into and out of such a sag be not abrupt, no measurable inequality of strain upon the draw-gear obtains, and still less anything approaching to bumping the cars together and consequent sudden jerks upon the draw-gear. The locomotive continues to exert the same tractive force, and the changes of velocity are gradual upon each car at once throughout the train.

A slight and gradual change of the tension on the draw-gear occurs, but it is only slight, and not transmitted from car to car. Therefore, the fact that such a sag might break up the continuity of a 50 ft. per mile grade and substitute for it, say 1,000 ft. of 35 ft. grade and 1,000 ft. of 65 ft., does *not* increase the effective ruling grade to 65 ft. per mile, nor in fact increase it at all above 50 ft. per mile. The loads hauled upon thousands of miles of line in this country are only possible on account of this fact, although of course it is always better to have a continuous grade line without sags of any kind. Whether this end is always worth the price that is paid for it is another question. Certainly so violent a liberty as 3 ft. vertical deviation from a grade line ought not to be lightly taken.

But it may be asked, if it were true that such deviations were possible without ill effects, why take the trouble to ease off grades for curvature? Why not trust to momentum to take the trains over the inequalities of resistance caused by the curves? The answer is that "hog-backs" in a long grade line are *not* admissible, without immediately increasing the *de facto* ruling grade (although not necessarily by the full amount of the highest rate of grade on the hog-back), and that an uncompensated curve has the same effect as a "hog-back" rising above the grade line, and *uncompensated by any preceding reduction*. The principle is the same as the one so familiar to hydraulic engineers known as the "hydraulic grade-line." If water is to be conveyed from a high reservoir to a lower point of delivery, it is an axiom in hydraulics that any liberties whatever can be taken with the grade of the pipes without affecting the discharge in the least, more than the same increase of length and curvature would do in a pipe laid to a uniform grade, provided the pipe at no point rises above a straight line connecting the points of supply and delivery, which is known as the "hydraulic grade-line." If, however, the pipe rises above this line, by however little, the discharge will immediately be reduced to correspond with the new hydraulic grade-line passing through the point of supply and tangent to the now highest point on the pipe with reference to the original grade-line.

The same holds true in principle with railroad grade-lines, although the deviations which are practically admissible are very slight, because great fluctuations of velocity are inadmissible. In theory a 10-mile grade of 50 ft. per mile might be broken up into (1) 5 miles of level and (2) 5 miles of 150 ft. per mile, without increasing the *de facto* ruling grade above 50 ft. per mile; but we *cannot* reverse the orders of these gradients, making the first last and the last first, without a theoretical as well as practical increase of the gradient to 100 ft. per mile. Even in the former case, this velocity at the end of the first five miles of level would have to be 87¾ miles per hour, assuming an initial velocity of 15 miles per hour. This is hardly a practicable speed for freight trains; and it therefore should not be understood that any such sag below a grade-line as that assumed above for illustration, 250 ft., is recommended. The only assertion made is that, assuming such speed to be practicable, even 250 ft. sags below a grade-line would do no harm, whereas any rise whatever above it would destroy it; and that in the meantime a depression of three or four feet below a grade-line is far less injurious than a rise of one foot above it.

## Employment of Women on Two French Railroads.

The Eastern Railroad in France has a great many women in its service, like most French railroads. But it is a general rule with it to reserve its positions primarily for the widows and orphans of employés who have died in its service. If none of these apply for vacant places, the applications first considered are those of wives, daughters or sisters of men in its employ.

Among the positions occupied by women on this road are those of ticket-sellers, clerks in accounting office, clerks in the general operating office, clerks in the general transportation and stores departments, and janitresses in charge of water-closets, these being accounted among regular employés, having a yearly salary, rights to pension, etc. Others not belonging to this class are women in charge of lunch and news counters, and other bazaars in the stations, and assistant ticket-sellers.

There are 116 women ticket-sellers on the Eastern Railroad and 22 assistants. The former receive from $36 to $800 a year, and on the average $170. In the larger stations they receive in addition certain allowances, including a yearly present of from $15 to $30.

In the accounting and stock offices there were at first four women; now there are 49. Part of these are employed steadily at monthly or yearly wages, and part only at the time of paying dividends. The chiefs in this office receive $400 to $700 a year; the temporary employés 60 to 65 cents per day. The average pay is about $250 per year.

The women clerks in the operating, transportation and stores departments are chiefly employed in statistical work and accounts. There are 22 of them, paid like those last mentioned.

The women in charge of the water-closets are mostly widows of employés who have been victims of accidents. There are 20 who have regular employment, and 35 hired by the day. They receive from the company $32 to $72 per year, and take fees from passengers, which vary from $2 to $200 a year. Their average income from both sources cannot be known, but is estimated to be about $156.

Sixteen women keep lunch counters, paying rent to the company, and making what they can. Two of these are said not to have made any profit so far; the other 14 get an income of from $140 to $1,360 a year, the average amounting to $620.

The women in charge of news stands are employed by a Paris firm which rents the privilege on this road, and those in charge of the bazaars for the sale of other small articles by the proprietors of the stands. One woman often serves in both places. There are 99 of the newswomen, earning $20 to $940 a year; 24 of the others, earning $10 to $700.

The assistant ticket-sellers are not employed by the company, but by the chief ticket-sellers, who are held responsible for them. There are 22 of these assistants, receiving from $90 to $270 a year, and on the average $160.

The road employs 2,000 women as assistant road guards, at $24, $28.40, $36, and, in exceptional cases, $48 a year, these being the wives of track hands, switchmen, etc., so that altogether the company has 2,500 women in its employ, of whom 420 are widows who form the sole support of their families.

Reports of April earnings from 17 additional roads have been received this week, 10 showing some decrease this year, but the 17 in the aggregate having an increase of 1½ per cent. No less than 13 of the 17 roads are Southern lines. These generally show a decrease, and this is hardly contradicted by an increase of 55½ by the Georgia Pacific, 119 by the New Orleans & Northeastern, 61½ by the Texas & St. Louis, and 322 by the Vicksburg, Shreveport & Texas, because these were doing very little last year, earning but $111, $135, $57 and $58 per mile respectively, and even after their great gains having this year only $157, $297, $92 and $136 per mile—that is, among the lightest reported by any railroads in the country. Heretofore the earnings of Southern roads have been much better maintained than those of Northern roads, the larger number showing an increase over last year's earnings; but it is not likely that this will continue. The South suffers less than the North from industrial depression, because it has few manufactures; but two successive light cotton crops must tell eventually, as they have long done west of the Mississippi. The decreases reported this week are generally very small, however, the largest being 8.2 per cent. by the Cincinnati Southern, 13.6 by the Columbia & Greenville, 13.5 by the Vicksburg & Meridian, and, in the North, 13.9 by the St. Joseph & Western.

This makes 57 railroads that have reported for April so far, having the following aggregate earnings:

| | 1885. | 1884. | Decrease. | P. c. |
|---|---|---|---|---|
| Earnings..... | $16,996,014 | $17,954,236 | $958,222 | 5.3 |

This includes some roads with large increase of mileage, and of these the Canadian Pacific alone had an increase of $333,000, and excluding this, the 56 American roads had a decrease of $1,291,255, or 7⅛ per cent.

Of most of the roads reporting a decrease this week it should be said that their earnings were larger than in 1883 or any previous year. This is true of the Alabama Great Southern, of the Richmond & Danville system taken as a whole, and of the Cincinnati Southern. All the roads, however, are comparatively unimportant, the entire 17, having 5,894 miles of road, earning on the average only $249 per mile. Only one earned as much as $400 per mile, and eight less than $200.

A statement of the earnings, working expenses, etc., of the Chicago, Rock Island & Pacific Railway for the year ending with March has been made this week, in advance of the annual report. This shows, compared with the four years previous:

| | Gross Earnings. | Expenses. | Net Earnings. | Fixed Charges. |
|---|---|---|---|---|
| 1880-81.... | $11,956,907 | $6,630 153 | $5,326,751 | $1,·71,337 |
| 1881-82.... | 13,·66,643 | 7,322,862 | 5,943,781 | 1,277,593 |
| 1882-83.... | 12,189,903 | 7.109,817 | 5,080,086 | 1,254,363 |
| 1883-84... | 12,535,514 | 7,29·,002 | 5,237,512 | 1,303 471 |
| 1884-85.... | 12,206,100 | 7,160,300 | 5,046 600 | 1,594,600 |

The gross earnings were thus 2¼ per cent. less this year than last, and 8 per cent. less than in 1882; the expenses have changed little for the last four years; the net earnings are the smallest for five years, though only a trifle less than in 1882-83, and not 4 per cent. less than in 1883-84. The fixed charges were decidedly greater last year than before, and 22 per cent. more than the previous year. This leaves the profit from traffic available for dividend:

| 1880-81. | 1881-82. | 1882-83. | 1883-84. | 1884-85. |
|---|---|---|---|---|
| $4,054,914 | $4,666.188 | $3.825,723 | $3,934,041 | $3,452,000 |

This year the amount is 12¼ per cent. less than last year, and 26 per cent. less than in 1881-2.

The company, however, has had considerable receipts from its land grant, varying from $650,000 in 1881-82 to $330,000 this year, and its whole available income over fixed charges has been:

| 1880-81. | 1881-82. | 1882-83. | 1883-84. | 1884-85. |
|---|---|---|---|---|
| $4,544,914 | $5,314,188 | $4,385,723 | $4 404,041 | $3,782,000 |

The yearly dividend of 7 per cent. requires $2,937,186, so that there has been a large surplus every year, though it is much less this year than heretofore. The profits per share, which were $12.66 in 1881-82 and $10.50 in 1883-84, were $8.23 last year.

The percentages of increase or decrease of gross and net earnings on this road for its fiscal year and on other Chicago roads for the calendar year has been:

| | Gross earn. | Net earn. |
|---|---|---|
| Chicago, Rock Island & Pacific ..... | Dec. 2 3 | Dec. 3.7 |
| Chicago, Milwaukee & St. Paul..... ..... | " 0.8 | Inc. 0.6 |
| Chicago & Northwestern .. ..... ... | " 6.1 | Dec. 7.0 |
| Chicago, Burlington & Quincy. .. ..... | " 2.4 | Inc. 2.3 |
| Chicago & Alton... ... .. ..... | " 1.1 | Inc. 0.1 |
| Illinois Central..... ..... | " 6 7 | Dec. 8.6 |

The Rock Island's decrease in gross earnings was thus nearly the same as that of its next neighbor on the south, the Burlington, but much less than that of its neighbor on the north, the Northwestern.

Chicago through shipments eastward of flour, grain and provisions for the week ending May 16 were a sixth less than the week before, but larger than in the corresponding week of any previous year. For six years they have been, in tons:

| 1880. | 1881. | 1882. | 1883. | 1884. | 1885. |
|---|---|---|---|---|---|
| 24 485 | 36.046 | 22,364 | 36,270 | 46,931 | 64,750 |

The shipments were thus 38 per cent. more than last year

and 80 per cent. more than in any other year. Shipments were made, it is reported, at rates as low as 12 or 13 cents per 100 lbs., while the rate was 15 cents last year. But the reduction in rates last week did not prevent a decrease in shipments compared with the week before.

For each of the last six weeks the total shipments and the percentage going by each road have been :

| *Tons:* | Apr. 11. | Apr. 18. | Apr. 25. | May 2. | May 9. | May 16. |
|---|---|---|---|---|---|---|
| Flour | 22,108 | 22,631 | 18,771 | 17,219 | 17,041 | 14,615 |
| Grain | 54,188 | 40,650 | 34,675 | 27,430 | 53,360 | 43,018 |
| Provisions | 6,793 | 7,188 | 6,869 | 7,139 | 8,099 | 7,117 |
| Total | 83,089 | 70,519 | 60,315 | 51,788 | 78,500 | 64,750 |
| *Per cent.:* | | | | | | |
| C. & Grand T. | 15 6 | 20.5 | 5.9 | 5.1 | 4 9 | 5.9 |
| Mich Cen | 20.9 | 15.5 | 15.6 | 13.0 | 25.7 | 28.6 |
| Lake Shore | 5.6 | 4 8 | 7.0 | 9.4 | 17.6 | 14.1 |
| Nickel Plate | 9.3 | 7.8 | 7.3 | 6.3 | 7.2 | 11.6 |
| Ft. Wayne | 18.7 | 25.6 | 29.5 | 30 1 | 21.8 | 15 6 |
| C., St. L. & P. | 16.8 | 14.1 | 18.6 | 14.5 | 9.2 | 9.6 |
| Balt. & Ohio | 6.6 | 8·4 | 8.6 | 4 4 | 8.2 | 11 2 |
| Ch. & Atlantic | 6.5 | 3.3 | 8.5 | 17.2 | 5.4 | 3.4 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

There was a considerable decrease in each kind of freight, 14 per cent. in flour, 19 per cent. in grain and 12 per cent. in provisions, so that we may not attribute it to the competition of the vessels, which carry little but grain—some flour, but next to no provisions.

The chief changes in the percentages are an increase of the already large share of the Michigan Central, and increases by the Nickel Plate and the Baltimore & Ohio ; a large decrease by the Fort Wayne, and smaller ones by the Lake Shore and the Chicago & Atlantic. The latter, which carried 8,918 tons two weeks before (when the total shipments were nearly a fifth less), carried but 2,222 tons last week. The Chicago & Grand Trunk carries very little of late weeks, probably not being anxious to get business at current rates. The three Vanderbilt roads together carried 54.3 per cent. of the total shipments ; the two Pennsylvania roads 25.2.

The Michigan Central carried 40⅜ per cent. of the flour; the three Vanderbilt roads together, 60 per cent.; the Fort Wayne, 18¾ per cent. The three Vanderbilt roads together took 54¼ per cent. of the grain; but the Baltimore & Ohio, which has not always been eager for freight at very low rates, stood next to the Michigan Central in amount of grain carried, having 15¼ per cent. of it.

The chief interest in the percentages shown is for the indication they give as to which lines are anxious for freight at current rates. Great increases in percentages in any week indicate that the lines getting them were first to make reductions in rates, or that other lines refused to meet the low rates made.

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While some of the Chicago railroads are having an exceptionally heavy freight traffic, it is a sign of the bad times that even they have a decrease in passenger earnings. We have seen that in the month of March there was an increase of 9 per cent. in the gross earnings of the Chicago, Burlington & Quincy Railroad, compared with last year. But even in this case the passenger earnings were 5 per cent. *less* than last year, the freight earnings having increased one-third.

For the three months ending with March, the earnings from different sources were :

| | 1885. | 1884. | Inc. or Dec. | P. c. |
|---|---|---|---|---|
| Passengers | $1,024,096 | $1,160,199 | — $136,103 | 11.7 |
| Freight | 4,809,470 | 4,262,605 | + 546,865 | 10.5 |
| Mail, express, etc. | 399,943 | 302,548 | + 97,485 | 32.2 |
| Total | $6,233,509 | $5,725,362 | + $508,247 | 8.9 |

Judging by the large increase in freight earnings, we should suppose that the country which this road serves is exceptionally prosperous; but in the face of a gain of 10½ per cent. in freight earnings, we find a loss of 11⅜ per cent. in passenger earnings, indicating that though the people who use the road have had much more freight than usual to ship, they do not feel prosperous, and travel less than usual.

As for the great increase in miscellaneous earnings, this is the continuation of a movement that began last year, when, though (for the whole year) freight earnings were 5 per cent. less than in 1883 and passenger earnings not 1 per cent. greater, the mail and miscellaneous earnings increased no less than 24 per cent. Compared with 1883 the earnings this year have been :

| | Passenger. | Freight. | Other. |
|---|---|---|---|
| Amount | Dec. $54,506 | Inc. $480,897 | Inc. $173,833 |
| Per cent | 5.0 | 11.1 | 77.0 |

Thus the passenger earnings this year were less even than in 1883, the freight earnings a ninth larger, while the miscellaneous earnings have increased no less than 77 per cent.—three times as much as the passenger earnings have decreased.

The latter is probably a quite general experience. Except when special circumstances have diverted or reduced freight traffic or earnings, the reduction in passenger earnings has probably been relatively the greater—or rather a falling off has been *more general* in passenger than in freight earnings ; for the "special circumstances" have been so common that a very large number of roads have suffered a loss in freight earnings, and especially passenger *rates* have suffered much less than freight rates. But lines largely or chiefly supported by traffic in farm products have many of them had a much larger freight than last year, and not a few of them larger freight earnings; yet on these, as elsewhere in the country, there are plain indications of hard times, one of which is this general reduction in passenger earnings, while a still plainer one, to those who know the movement of west-bound freight, is a reduced consumption of merchandise and the materials of construction.

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A new plan for reorganizing the West Shore Company has been adopted by the two committees headed by Mr. Hewitt and Mr. Colgate, respectively, the chief features of which are a reduction of the proposed issue of first-mortgage bonds, and the declaration that "no obligation is imposed to purchase the terminals." The first-mortgage bonds are to be exchanged for 5 per cent. second-mortgage bonds for the amount of their face (not including unpaid coupons), and these bonds will vote. They may be converted into a 6 per cent. preferred stock. One share of common stock will be issued for two of the old company on payment of an assessment of $5. This will give $20,000,000 common stock, which will yield $1,000,000, in case it is all taken by the holders of old stock, which is very doubtful. New first-mortgage bonds may be issued to the extent of $20,000,000 if the terminal property is purchased, but of only $15,000,000 if not; but the company will have authority to issue $5,000,000 one year after reorganization, with the approval of two-thirds of the second-mortgage bonds or preferred stock—a wise provision, for the company will almost certainly need additions to its property if it has any growth in traffic. An additional amount of second-mortgage bonds may be issued to pay or help pay for the terminal property.

This makes it uncertain what the capital of the proposed new company will be. Should the holders of the present stock decline to pay $5 per share for the new stock, none of it might be issued. At most there would be $20,000,000. The preferred stock will be issued only if the present first-mortgage bondholders prefer it to second-mortgage bonds bearing 1 per cent. less interest. The first-mortgage bonds may be $15,000,000 to $25,000,000. This is much more favorable to the bondholders than the first proposition. The control of the property is left in the hands of the present first-mortgage bondholders.

The yearly fixed charge contemplated is not to exceed $1,250,000, for the interest on the second-mortgage bonds is payable only if earned.

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Earthquakes are hardly among the subjects which railroad men have to study, but those of them who have had the misfortune to make annoying numerical errors in statements of fact may be consoled by one (or rather two) in Richard A. Proctor's article on earthquakes in the June *Harper's*, which one would hardly expect to pass the scrutiny of a skilled proof-reader, but which we have not as yet seen noted. The errors are in the statement that "an increase of about one inch in the height of the mercurial barometer corresponds to a weight of 650 lbs. to each square foot, or about 852,000 tons on each square mile." Instead of 650 lbs. the statement should read 70.5 lbs., and instead of 852,000 we shall then have 877,400 gross tons, or 982,700 tons of 2,000 lbs. At 650 lbs. per square foot we should obtain 8,089,700, or 9,060,480 tons respectively, none of these figures bearing any apparent relation to those given, so that the source of the errors can be divined.

The ultimate error is not great, so that the following argument is not sensibly affected, but this is certainly not "astronomical accuracy," and although the example of the great Newton himself, who found trouble in correctly adding short columns of figures, might be pleaded in extenuation, it would hardly be a pleasant kind of error for a younger and less known man to make in a computation on which his whole argument was based. He might have occasion to think the earthquake had struck him.

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One does not hear much said nowadays of the advantages of narrow-gauge railroad, but occasionally an opinion is expressed, like the recent declaration of the President of the Connotton Valley Railroads, that "The fatal mistake of the promoters of this railroad was the delusion that a 3 ft. gauge was cheaper to build and to operate, and generally that a narrow gauge was better than a standard gauge." The line (115 miles long with 46 miles of branches) is to be changed to standard gauge as soon as the money can be obtained. Included in it is a short line which was changed from the standard to the narrow gauge when the line was built.

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## Record of New Railroad Construction.

Information of the laying of track on new railroads in the current year is given in the present number of the *Railroad Gazette* as follows :

*Memphis, Selma & Brunswick.*—Extended westward to Memphis, Tenn., 12 miles.

*Minnesota & Northwestern.*—Extended northward to West St. Paul, Minn., 7 miles.

*Tavares, Orlando & Atlantic.*—Track laid from Tavares, Fla., southeast to Orlando, 28 miles.

This is a total of 47 miles, making 451 miles thus far reported for the current year. The new track reported to the corresponding date for 14 years past has been :

| | Miles. | | Miles. |
|---|---|---|---|
| 1885 | 451 | 1878 | 385 |
| 1884 | 885 | 1877 | 393 |
| 1883 | 1,460 | 1876 | 418 |
| 1882 | 2,991 | 1875 | 250 |
| 1881 | 1,386 | 1874 | 429 |
| 1880 | 1,502 | 1873 | 827 |
| 1879 | 570 | 1872 | 1,305 |

This statement covers *main track only*, second tracks and sidings not being included.

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## NEW PUBLICATIONS.

The *Railway Reporter*, for some years past published in Pittsburgh, by Mr. James G. Fulton, has been sold by him to Mr. George A. Frey, who has united the paper with the *Railway Record* and will continue the publication of the paper under the name of the *Railway Reporter*. The office, however, will be removed from Pittsburgh to Philadelphia.

*Transactions of the American Society of Mechanical Engineers.* Vols. I. to V., with General Index. New York. Published by the Society.

The collection of 138 papers (omitting 11 which are called for by the numbers but do not appear in print) contained in these five volumes must certainly be considered a creditable showing for a society which was only incorporated in 1881, and was naturally at first small, although it has already attained to a membership of 557 and appears to be enjoying a healthy growth. It differs from the American Society of Civil Engineers in that it has no local headquarters, beyond a business office in the city of New York, and holds no stated meetings in this or any other city, contenting itself with holding one annual meeting in New York, and, according to the constitution, *two*, but, in fact, so far, only *one* yearly convention in other cities. In the first year only the two meetings were held as provided. In this manner of holding meetings the Society resembles the American Institute of Mining Engineers, which has now attained an even larger membership, viz., 1,414 of all classes.

Any review of the papers in detail would lead us too far, but there are few, indeed, of them which would not be of direct interest to a Superintendent of Motive Power or Master Mechanic, who studied the theory of his calling with care. Many such officers are already members of the Society, and it is both for the interests of members and of the Society that more should be.

To mention only some leading papers of the last volume, such papers as "Motion Curves for Cut-off Valves," "A New Valve Motion," "Drop-Press," "Non-Conducting Coverings" (a valuable and careful paper), "American Machinery at International Exhibitions," "Power Cranes," "Testing Metals," "Helical Springs," "A Drawing Office System," "Speed Indicators," "Boiler Tests," and a number of others toward the end of the volume are well calculated to interest practical railroad officers, many of whom, who do not call themselves mechanical engineers, would, no doubt, be recognized as such, in fact, within the meaning of the constitution

Another fact strikes one on comparison of these transactions with those of the American Society of Civil Engineers ; that to a great extent the papers are on similar topics and appeal to the same class. A rough count shows something over one-third of the papers to be on topics similar to those which constantly appear among the papers of the older society. As the line can never be sharply drawn between civil and mechanical engineering, it is from some points of view a pity and a waste of force to have two entirely distinct societies instead of a single society organized in section. The difficulty of forming a practical plan to that end, however, would perhaps be great, and it would now appear to be too ate.

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## Apparatus for Testing Journal Friction in a Lathe.

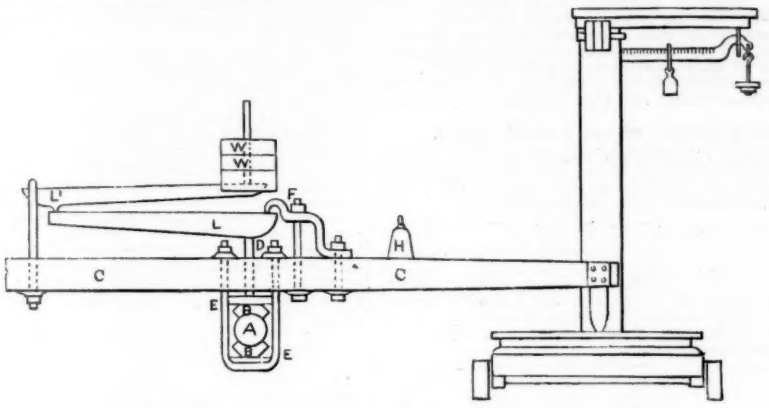
The number of questions still unsettled in respect to journal friction is considerable, and some of them are very promising subjects of investigation, as notably to what extent extreme low temperature and the *manner* of lubrication affect or may be made to affect the journal friction, how much greater it is in starting, or at extremely slow speeds, than when under way, etc., etc., in addition to the usual questions of the quality of various oils, which have already been made the subject of many experiments. The apparatus herewith illustrated, the account of which we extract from a paper recently presented before the American Society of Civil Engineers on "Experiments with New Apparatus on Journal Friction at Low Velocities," by A. M. Wellington, C. E., was designed and used some years ago to investigate some of these questions, for which ordinary apparatus was not deemed to be well suited, and with such satisfactory results that the writer says that although very simple and cheap, "it is believed, when properly constructed, to possess every important advantage of the various testing machines in use, with some peculiarly its own."

One of our leading railroad companies has now under construction a more perfect form of the apparatus illustrated, adding to it automatic registering devices. Its nature and working is thus described by the author :

"The axle *A* to be tested is placed in an ordinary lathe, having as great a variety of speeds as possible. The testing apparatus, as actually constructed, consisted of an oak beam *C*, about 4 in. × 4 in. in size, and about 5 ft. long, carrying the compound lever $LL^1$, each of which multiplies the load applied about 11 times, or, in the aggregate, 125 times. The yoke *E* encircles the axle and bears against the brass *B* underneath it, thus furnishing the necessary resistance to the action of the levers and throwing the same load upon the lower brass *B* as is imposed by the levers directly on the upper brass by transmission through the pin *D*, the latter being passed through a hole in the beam *C*. The pressure was transmitted to both the upper and the lower brass by suitable iron blocks (shown in the cut directly above and below the brasses), representing as nearly as might be the ordinary form of the top of a journal box.

"As thus constructed, it will be seen that the entire apparatus (when properly balanced, which is perfected by the light counterpoise *H*) is poised in unstable equilibrium on the axle *A*, and opposes no resistance to motion in either direction, except such as arises from friction. A very heavy load may be thrown on the bearings, viz., 6,000 lbs. (3,000 lbs. on each bearing) for every 24 lbs. of load *W*, placed on the extremity of the compound lever, but the only weight thrown upon the lathe-centres is the dead weight of the apparatus itself, which was kept constant at 205 lbs.

"The load thrown upon the bearings by this apparatus




Apparatus for Testing Journal Friction in a Lathe.

consists (1) of the dead weight of the entire apparatus, including both brasses, the weights $W$ and all intermediate parts, which rests entirely on the upper brass $B$; (2) the load thrown upon the pin $D$ by the weight of the levers themselves, which was determined by fixing the centre of gravity of each lever $L$ and $L^1$ by balancing it upon a knife-edge, and then considering the weight of each to be concentrated at its centre of gravity; and (3) the strain produced by the levers by the addition of the weights $W$.

"These last two strains, (2) and (3), produce an equal reaction against the upper brass (through the pin $D$) and the lower brass (through the yoke $E$), whereas the dead weight of the apparatus, although likewise transmitted through the evers to the pin $D$, produces no reaction against the lower brass. It is, at first sight, somewhat confusing to see how both the *dead* weight of a load $W$, and the same weight $W$ *as multiplied by leverage*, can reach the upper brass by transmission through the same levers to the same pin $D$ and brass $B$, as they plainly do, and yet in the one case produce an equal reaction against the lower brass, and in the other not; but the reason will be clear if we conceive the levers to be blocked up so as to be inoperative. The centre of gravity of the entire apparatus (after having been properly balanced by the counterpoise $H$) is directly above the pin $D$, and produces strain upon the upper brass only. By removal of the blocking the conditions as respects dead weight are in no way changed, but the additional strain caused by the leverage is added to that heretofore transmitted through the pin $D$, and this latter only produces reaction against the lower brass through the yoke $E$.

"When the axle $A$ is caused to revolve, the lever $C$ is held stationary by the platform scale, and the pressure produced upon it furnishes an exact and direct measure of the journal friction. It was found in practice that this pressure, varying from 10 to 140 lbs. with the proportions actually adopted, and the gradual changes therein during test, could be weighed with as much delicacy and ease as if it were a material substance resting upon the platform of the scale; the friction produced, although it did not remain absolutely stationary, varying so very little and so slowly that the beam of the scale would sometimes vibrate slowly and gently between the guards for 10 minutes at a time.

"The advantages of the apparatus are: It is very light and cheap; the actual weights to be handled are very small, s that they are readily changed, and but little strain is produced on the machine; it can be used in any ordinary lathe and with an ordinary platform scale, enough varieties of which can be obtained without special construction to satisfy every requirement; it is positive in its action throughout, and no delicate computation and construction of scales is necessary for its use, and it admits of any desired delicacy of readings by the simple substitution of more delicate scales. The common platform scale of the shop where the tests were made was deemed sufficient in this instance, since the stresses actually weighed ranged so high that the error of observation from lack of delicacy in the scales could rarely exceed a fraction of 1 per cent. It is also especially suited, if not the only form well suited, to testing a wide variety of different journal speeds, especially very low speeds."

It is suggested in the paper, further, that it is desirable that the beam $C$ should be of iron with the yoke $E$ and the fulcrum-bearings near $F$ and $L^1$ and integral part thereof, and that the pin $D$ should be a slotted block surrounding the bar $C$. Arrangements for lubrication by bath or otherwise and for applying refrigerating mixtures are also suggested. The entire success of the apparatus was found to depend upon the use of platform scales instead of spring or other weighing apparatus which required or permitted *motion* of the journal to indicate varying friction.

We shall hereafter present some of the results of these tests, which were made primarily to test the correctness especially in respect to initial friction at low velocities, of a series of other tests of rolling stock resistances, made by the writer in a totally different manner, on the Lake Shore & Michigan Southern Railway. A report of these tests was published in the *Transactions* of the Society for February, 1879, and summarized in the *Railroad Gazette* of July 16, 1880; but it may be repeated here that the mode of test was by what may be called the gravity or "drop test," starting cars from a state of rest down a known grade, and deducing the resistances from the velocity acquired by the aid of appropriate electrical apparatus, which was perfected after some experimenting, giving time-records which were easily read to one-hundredths of a second, with a probable error of one or two hundredths of a second; thus reducing the probable error in computation to a very small margin. The correspondence in results obtained is said to have been very satisfactory.

## THE SCRAP HEAP.

### Getting Even with the Conductor.

Some time ago the *Record* told the story of a conductor on the Boston & Albany road who invited a lot of his brother conductors to go fishing for black bass, and who, when they accepted the invitation, took them to a place where they were all arrested for illegal fishing and fined $5 and costs each. Since this incident the conductors have been laying for a chance to get even with their hospitable brother. About a month ago the getter-up of the fishing expedition happened to mention to some of the other conductors that he was keeping a lot of hens, and said that he was particularly anxious to get a setting of pure Plymouth Rock eggs. One of the conductors offered to furnish them, and did. He guaranteed the eggs to be genuine Plymouth Rocks. They were. He also guaranteed them to be sound and fresh. They were.

But the hen sat for three weeks on them, and there was not a chicken nor a peep from one. The amateur poulterer guessed he had made a mistake in his reckoning, and let the hen set another week.

Still no chickens. The conductor then took the eggs and made an examination of them. They had every one been boiled hard!

The conductors who paid $5 apiece for their fishing think they have made a modest start toward getting even with the other fellow.—*Boston Evening Record.*

### It was Loaded.

A short time before the departure of the West Side train Tuesday morning two of the intending passengers were fooling with a Winchester rifle which one of them was taking along with him. Of course the rifle was loaded, and of course neither of the men knew it, and of course it went off accidentally, just when the muzzle had been brought to bear upon the office. The agent, Mr. Ward, and several clerks were at work. The ball struck the partition near the office door about five feet above the floor, passed through two inches of solid fir planking, crossed the office, fifteen or twenty feet, shattered a window pane, carrying away a portion of the sash, struck the side of a box-car standing outside, several feet from the building, passed clear through an inch and a half of hard plank, crossed the car and penetrated over an inch a piece of frame supporting the roof. In its passage it just missed F. J. Smith, who was making out his bills at the desk. He will not make the bills so large in future, and will keep one eye on any man who comes fooling around that depot with a gun of any kind.—*Portland Oregonian.*

### Bessie Runs the Engine.

All the engineers on this end of the Fort Scott road accompanied the remains of McDaniels to Fort Scott last Saturday. On Sunday it was found necessary to send a train out to the Ninnescah bridge with material, and, no engineers being on hand, Mr. George N. Bauman put his daughter Bessie, a school girl, in charge of the engine, furnished her with a fireman, and she did her work nobly, handling the throttle and guiding the iron steed as well as the best man on the road. Bessie has frequently run the engine about the yard, but never before made a trip on the road. We don't know of any other road having female engineers.—*Wichita (Kan) Eagle.*

### A Railroad Museum.

As a means of showing the progress in railway appliances and for the preservation of relics of the old railroad days, the New York Central & Hudson River Railroad Co. has begun the formation of a miniature museum in the rooms attached to the railway branch of the New York Young Men's Christian Association in the basement of the Grand Central Station. The articles thus far contributed are but few in number, but they show in a remarkable way the giant strides made in machinery and equipment since the little engine made by Peter Cooper drew, in 1830, the first train over the then 18-mile road now known to the world as the Baltimore & Ohio.

Among the relics are the old driving wheels of the "De Witt Clinton," the first locomotive built within the limits of the state, and the third constructed in America. The first trip of the engine was made on Aug. 9, 1831. The wheels, which now would not be recognized as a part of the locomotive, are apparently in as good order as when turned out of the West Albany shops, over 50 years ago. They are about 5 ft. in diameter, but, unlike those now in use, are not solid, but built up from the hub like an ordinary wagon wheel. The hub is solid, from which extend the spokes, 1 in. in diameter, welded to the felly and fastened by bolts to the hub. The felly is about 3 in. wide and ½ in. thick. The outer edge is dotted with holes, through which the counter-sunk bolts passed, holding the steel flange, now replaced by a flanged tire. The wheels weigh only 350 pounds, as compared with 1,900 pounds, the weight of the driving wheels, exclusive of the tires, now used on an ordinary engine.

In another corner of the room is a glass case containing a section of the old style stringer, with a piece of the old strap rails in general use till the T-rail was invented. The stringer and rail were laid on the Syracuse & Auburn Railroad in 1838. The rail is simply a flat bar 2½ in. wide and ⅞ in. thick. Alongside is strapped the old style of railway spike, looking not unlike a common tenpenny nail. Travelers of the olden time recall the frequent accidents of those days, when by the pounding of the trains on the flat bars the countersunk spike would fly out, with the result that the old snake-head rails, as they were termed, would fly through the bottoms of the cars, tearing and ripping through everything and frequently breaking the legs of the trustful passengers.

The museum also includes a specimen of the early time-tables of the Hudson River Railroad, when it terminated at Poughkeepsie. This shows that, despite the marvelous improvements in the engines and equipment, the leveling, straightening and ballasting of the tracks, the old wood-burning locomotives managed to make about as good a rate of speed as their costly coal-burning successors. One of these time-tables, dated July 7, 1851, gives the schedule time of trains running from the corner of Chambers and Hudson streets, whence they were drawn by horses to Thirty-second street and Tenth avenue, to Poughkeepsie as 2 hours and 45 minutes. Similar trains, propelled by steam power, from the Grand Central to the same station now take 2 hours and 14 minutes. It is intended to search through the old car shops for any other relics that may now be stored away and bring them together, where they may find a permanent home and illustrate the gradual evolution of railway appliances and machinery from the primitive and crude properties in use at the beginning of railway building to the present perfected machinery now deemed essential on railways everywhere.—*New York Times, May 17.*

### Conscience Money.

Mr. C. W. Adams, General Western Passenger Agent of the Pennsylvania Co., was yesterday the recipient of a great surprise—namely, a letter from an honest man. The letter was dated Laporte, Ind., and, accompanied by a postal order for $2.95, stated that the writer had recently been a passenger on one of the company's trains, and as the conductor failed to collect any fare he sent $2.95, the amount he would have paid for his ticket. Mr. Adams intends to have the letter put in a $5-frame. The millennium is certainly near at hand when a man will deliberately and in his right mind pay for his railway fare.—*Chicago Inter-Ocean, May 17.*

### An Old Locomotive.

Running on the little branch road from the Pennsylvania at Edgewood station up to the mines of the Hampton Coal Co., above Wilkinsburg, is probably the oldest engine now in use in the country. Up to within three or four years "Old Hannah," as she is called, was in active use on the main line of the road. For over a quarter of a century the old engine passed and repassed, hundreds of times, to and fro between Pittsburgh and Philadelphia.

"Old Hannah" was built at the Baldwin Locomotive Works in 1851, and was the first of its kind ever built in this country. The number on her front is No. 1. In her day, before the great improvements on locomotives were brought out, she was considered a wonderful engine; and she was, too. Strong, well built, and with powers of great speed, "Old Hannah" had matters pretty much her own way on the road. As she was the oldest, the other locomotives kind of laid back out of the way when she came dashing along. They showed her great respect. But it was during the stirring times of the war that "Old Hannah" made for herself her great reputation. Tom Lacock, the engineer now in charge of the old veteran, is well acquainted with her history. "During the war," he said yesterday, "'Old Hannah' tugged more soldiers through to Philadelphia than any two engines on the road. She was running specially on this line of duty. I knew her engineer, and I think he was prouder of his engine than any man I ever knew. For twenty-nine years he held the lever on 'Old Hannah,' and she never got ugly, or refused to do her work. She was a model in her behavior. I never heard of her wrecking a train or smashing up anything."—*Pittsburgh Chronicle-Telegraph.*

### Improving the Cow-catcher.

A great many ingenious devices have been produced to supplement the action of the locomotive cow-catcher, in persuading stray bovines to give the resistless locomotive free right of way. The cow-catcher performs its functions fairly well, but it is apt to leave the animals it operates upon in a dilapidated condition. This leads to expense for damages. The inventive genius of the country is wrestling with the problem of leaving the track unfenced, yet providing the means of removing peripatetic steers and hogs without subjecting them to the rigorous concussion of a hard cow-catcher. One inventor proposed a huge cushioned funnel to be pushed in front of the locomotive, in which stray animals might be caught, and wafted gently back into an elegant chamber prepared for their reception. That did not appear to fill the needs of the railroad world, if we are to judge by the severe way it was left alone.

Another candidate for favor appeared with a rotary cow-catcher, which was to send the trespassing cows over the top of the smoke stack. As the flight might have destroyed the milking qualities of the cows, railroad companies did not take kindly to that idea. Invention was not discouraged with these failures. A patent was recorded for the means of injecting a stream of hot water in front of the locomotive, as a gentle hint to all and sundry that worse would befall them if they did not get out of the way of the coming train. That device must have been found wanting in practice, for what may be regarded as a long-felt want has just been afforded protection by the Patent Office. The inventor of the latest improvement proposes to stretch out from the front of the locomotive a long, lazy-tongs arrangement, which ends with two projecting fingers, one of them holding a whistle, the other a prog. A rubber pipe will convey steam or air to sound the whistle, and if its noise should fail to alarm the cow, the prog will give it a more vigorous reminder to get out of the way.

Any cow stupid enough to neglect the last warning, would receive no sympathy when she brought rougher treatment upon herself.—*American Machinist.*

### Canceled Erie Tickets at Large.

Publication was given by the New York *Sun*, May 18, to a story to the effect that canceled tickets on the New York, Lake Erie & Western Railroad, dated Friday and reading from New York to Salamanca, were thrown about Broadway from Bowling Green to the Post Office on Sunday by a person wearing a uniform and apparently intoxicated. General Passenger Agent Abbott said that the matter did not fall in his jurisdiction, which ended with the sale of tickets. Auditor Little said that he had not seen any of the tickets, but he had not troubled himself about the matter, believing that it was probably an advertising dodge of some Broadway agent. Canceled tickets were received and destroyed. They could not get out of the office in the first place, but if they did, there were not enough tickets sold to Salamanca to enable any one to litter even a single block in Broadway.

### In Georgia.

"How long does this train stop for refreshments?" asked a traveler as he entered a railroad restaurant in Georgia.

"It depen's on how hungry de conductah am, sah," said the waiter.—*Exchange.*

### Don't Stand Near the Track.

The danger of standing too near a railroad track when waiting for trains, was illustrated at Cornwall the other day. A lady took her child in a small carriage on the platform in front of the station, and taking the child in her arms left the carriage standing within a few feet of the track. Soon the

lightning express flashed by, and the suction from the current of wind produced by the rapid motion whirled the carriage under the train and demolished it into the smallest fragments. It is frightful to think of what might have been the fate of the child if it had been left in the carriage.—*Port Jervis (N. Y.) Gazette.*

## TECHNICAL.

### Locomotive Building.

The Cooke Locomotive Works in Paterson, N. J., are building 4 locomotives of the Forney pattern for the Staten Island Railroad and 2 passenger engines for the Florida Southern. They have also some other work in hand.

The Manchester Locomotive Works in Manchester, N. H., are building a heavy freight locomotive and a shifting engine for the Concord Railroad.

The Rogers Locomotive Works in Paterson, N. J., are building several engines to go to Cuba. They have also on hand an order for the New York, West Shore & Buffalo road, and several small orders for Southern railroads.

The erecting shop at the Grant Locomotive Works in Paterson, N. J., is now being rebuilt in order to secure more room, and the upper floors of this building are being raised, the height of the erecting shop having been insufficient for the large engines now built. This shop is the oldest portion of the works, and has been in use for many years.

The Schenectady Locomotive Works, in Schenectady, N. Y., are running full time and building at the rate of 10 locomotives a month. During the present month they ship 6 passenger engines, 18 by 22 in. cylinders, to the Chicago & Northwestern; 2 ten-wheel freight engines, 19 by 26 in. cylinders, to the Chicago, Milwaukee & St. Paul; 2 mogul freight engines, 18 by 24 in. cylinders, fire-box designed to burn refuse bituminous coal or dust, to the Fall Brook Coal Co.; a narrow-gauge mining engine, 9 by 14 in. cylinders, to the Clearfield Bituminous Coal Co.; and a passenger engine for suburban service, 14 by 18 in. cylinders, to the Rochester & Lake Ontario road.

The Dickson Manufacturing Co., of Scranton, Pa., has opened a branch office at No. 110 Liberty street, New York. Mr. George B. Ross (recently with the New York, Lake Erie & Western road) is in charge of this office.

The Brooks Locomotive Works, in Dunkirk, N. Y., are building six heavy locomotives for the Louisville, New Albany & Chicago road. In a recent item this order was, by a mistake, credited to the Rogers works.

### The Car Shops.

The Gilbert Car Co. in Troy, N. Y., have just completed 1 passenger, 1 combination and 1 baggage car for the Fall Brook Coal Co., and is rebuilding 20 sleeping cars for the New York Central Sleeping Car Co. The company has also taken a contract for 250 box and 100 flat cars for the Panama Railroad.

The Jones Car Works in Schenectady, N. Y., are rebuilding 25 sleeping cars for the New York Central Sleeping Car Co.

### Bridge Notes.

The Hawkins Bridge Works in Springfield, Mass., have taken a contract for an iron bridge across Lake Champlain, from North Hero, Vt., to Alburg. This will be the first iron bridge across the lake, the existing bridges being pile structures. The Hawkins works have also contracts on hand for bridges for the Boston & Albany and the New York Central roads.

### Iron and Steel.

Crozer furnace at Roanoke, Va., having been relined and repaired, was to go into blast this week.

The Cleveland Rolling Mill Co. in Cleveland, O., is putting its new blooming mill in order ready to commence work.

The Pennsylvania Steel Works at Steelton, Pa., are very busy in all departments. The rail mill is running chiefly on some orders for light rails, and the rolling mill is very busy filling some large orders for structural steel.

A syndicate of Pittsburgh capitalists have offered to establish a rolling mill in Uniontown, Pa., provided some local subscriptions are made to the project.

The North Chicago Rolling Mill Co. has again started up its South Chicago mills, the employés who struck some weeks ago having agreed to return to work at the old wages.

Franklin furnace in Sussex County, N. J., has gone out of blast somewhat unexpectedly. The furnace has been running on Bessemer pig, and the stoppage is occasioned by the closing of the Scranton Steel Works, which have taken all the iron from the furnace.

La Grange Furnace in Harford County, Md., is to be sold at public sale June 2. The furnace is a charcoal stack 32 by 7½ ft., built in 1836, and has not been in blast for several years.

### Manufacturing and Business.

The Hale & Kilburn Manufacturing Co., of Philadelphia, announce that they have purchased all the machinery, tools, stock and patents pertaining to car-seats and car-seat springs of Zenas Cobb, of Chicago, including the Cobb Elliptic spring patent and all those of H. B. Cobb. This is an important acquisition which will probably add largely to the already extensive manufacture by the Philadelphia company.

Rees & More in Pittsburgh have just completed a steel-hull river steamboat 90 ft. long, 22 ft. beam and 3½ ft. depth of hold, to go to Mexico. The boat is of the stern-wheel pattern, the wheel being 14½ ft. diameter with buckets 17 ft. long. The engines have cylinders 10 in. diameter and 48 in. stroke.

The Sheffield Velocipede Car Co., of Three Rivers, Mich., has bought the patents and business of the Dodge Railroad Stand-pipe Co., of Niles, Mich., and will hereafter be sole manufacturers of the Dodge stand-pipe. That stand-pipe is used exclusively by the Michigan Central, the Detroit, Lansing & Northern and a number of other roads, and is largely in use on the Atchison, Topeka & Santa Fe, the Grand Trunk, the Missouri Pacific and other lines. Its approval by those roads and its manufacture by a firm of established reputation for good workmanship will secure its extended use.

### The Rail Market.

*Steel Rails.*—The market is quiet and quotations continue at $27@28 per ton at mill for ordinary sections, and $29@$31 for light rails. Quite a number of orders for small lots have been placed and the mills which are running are all busy.

*Rail Fastenings.*—Nominal quotations continue unchanged at 1.90 cents per lb. for spikes in Pittsburgh; 2.25@2.60 for track-bolts and 1.65@1.75 for splice-bars. There is very little business doing.

*Old Rails.*—Old iron rails are in light demand just now, with quotations uncertain. Holders are asking $17.50@$18 per ton at tidewater, but buyers seem unwilling to meet those prices. Old steel rails are quoted at $17@$17.50 per ton in Pittsburgh, with very light supply.

### Car Couplers.

In pursuance of the call published elsewhere, one session of the Master Car-Builders' Association, at its convention next month, will be devoted especially to the discussion of the car-coupler question, the special object being to secure uniformity in the adoption of the improved coupler, which, it is now generally admitted, is a necessity. That an agreement can be reached which will secure complete uniformity is not expected, but the discussion will do good, and may lead to some action which will prevent the adoption of an embarrassing diversity of devices. The announcement will start into new life the discussion of the coupler question, which has been comparatively quiet of late.

### Blast Furnaces of the United States.

The *Iron Age* says: "In another column we give our monthly report showing the condition of the anthracite and bituminous furnaces of the United States on May 1, 1885. The table, in a condensed form, presents the following:

| | In blast. | | Out of blast. | |
|---|---|---|---|---|
| Fuel. | No. | Weekly capacity. | No. | Weekly capacity. |
| Anthracite | 80 | 20,729 | 140 | 32,515 |
| Bituminous | 95 | 46,397 | 127 | 44,870 |

"To furnish data for comparison the following table is presented, showing the number of furnaces of each class in blast on the first day of each month of the present year, and the capacity of the same:

| | Anthracite. | | Bituminous. | |
|---|---|---|---|---|
| | No. in blast. | Capacity per week. | No. in blast. | Capacity per week. |
| Jan. 1 | 86 | 21,564 | 82 | 36,812 |
| Feb. 1 | 81 | 21,189 | 87 | 41,653 |
| March 1 | 80 | 22,859 | 91 | 46,774 |
| April 1 | 82 | 21,704 | 90 | 45,655 |
| May 1 | 80 | 20,729 | 95 | 46,397 |

"This table seems to indicate that the anthracite and coke iron branches of the trade are pursuing opposite courses, the anthracite furnaces being credited with a steadily-decreasing number of stacks in blast, while the bituminous and coke furnaces in blast are as rapidly growing in number. There have been but few changes among the anthracite furnaces. Quite a number of fluctuations have, however, taken place among the coke furnaces, which have not affected the totals of the tables."

### American Institute of Electrical Engineers.

The annual meeting was held in New York, May 19, with a large attendance.

The report of Acting Secretary T. C. Martin shows that although the institute has only been in existence one year, it has 279 members and associates in all parts of the country. The institute has as yet no permanent home, but a proposition has been made to have the various scientific societies of New York unite in securing a permanent fire-proof building for their joint use. This is now being considered by a joint committee. The meeting continued on May 20, when several papers were read and discussed. In the evening the annual dinner was attended by a large number of members.

### American Society of Civil Engineers.

At the meeting of this society in New York, May 6, the presentation to the society by Dr. J. E. Hilgard, Superintendent United States Coast and Geodetic Survey, of a model of the basin of the Gulf of Mexico, from soundings made by the United States Coast Survey, was announced.

A paper by Elliot C. Clarke, Records of Tests of Cement made for the Boston Drainage Works, 1878–1884, was presented. This paper will be published immediately in the *Transactions* and will be discussed at the approaching convention in connection with the report of the Committee on a Uniform System for Tests of Cement.

The discussion of the paper on the South Pass Jetties was continued by Messrs. James B. Eads and E. L. Corthell. Abstract of the discussion on this paper has been postponed until the discussion (which has been continued for several meetings) should be finally completed.

### New England Railroad Club.

The regular monthly meeting of this Club will be held at its rooms in the Boston & Albany station in Boston on Wednesday evening, May 27, at 7:30 o'clock.

*Subject for Discussion.*—By what means can railroads be protected against the use of inferior wheels? Is it the fault of railroads or the manufacturers that they are used?

Should there be a standard wheel, as to quality, uniform size and weight, prescribed for use in interchange service?

Should Rule 20 be abolished?

Should Rules 10 and 11 which govern the charges and defines the defects of wheels be made more definite?

By what means can railroads protect themselves against the detention of cars on foreign roads in consequence of disputed responsibility in case of damage or otherwise?

Should a penalty be attached in case of failure to return such cars within a certain specified time?

A general discussion of the question of interchange will be in order.

The committee appointed to arrange for transportation to the Master Car-Builders' Convention at Old Point Comfort, Va., June 9, reports that arrangements for transportation (by water) have been made with the Merchants and Miners' Transportation Co., whose steamer "D. H. Miller" will leave Central Wharf, Boston, on Saturday, June 6, at 3 p. m. The fare will be $8 each way, including stateroom and meals. Members can procure tickets at the meeting, or on application to the chairman of the committee, George W. Peck, at No. 26 Beach street, Boston. To secure staterooms tickets must be paid for by June 1.

### Engineers' Club of St. Louis.

The 248th meeting was held in St. Louis, May 13; 17 members and 7 visitors present. Walter S. Russell was elected a member.

The committee to consider the status of civil engineers in the employ of the United States made the following report:

"Your committee to consider the status of civil engineers in the employ of the United States respectfully reports:

"That we find the question of the relation of civil engineers to the public works undertaken by the General Government was one of considerable prominence in the debates in Congress, during the late session of that body, and is now in the public press. Also, that there is a general impression that the time has come for an increase in the numbers of the Corps of Engineers sufficient to enable them to conduct the works under the present organization without employing civilians, or for a reorganization of that branch of the public service, by which it shall be made a distinctively civil service.

"Your committee is decidedly of the opinion that the best interests of the military service, as well as those of the civil engineering profession and of the country as interested in both these, demand that the latter alternative be the one pursued.

"Your committee regrets to see the discussion of the subject in the public press turning aside from the broad question of creating an organization for the conduct of public works, which shall be equitable and just in distribution of rewards for merit, in promotion to higher rank and pay; which shall recognize the change in the condition of the engineering profession, both military and civil, since the days when both had to be imported from Europe, and which shall allow its engineers to come by judicious selection the same as judges are selected, from the ranks of a profession and not from the roll of a single school.

"To this question personal matters, past, present or future, the value of different schools and mode of training, or the honesty and truthfulness inculcated through certain associations, are alike foreign.

"There seems, therefore, to be need for a conservative influence, lest the utterances of individuals be taken as expressing the views and wishes of the engineering profession, and lest a discussion of a pure question of public policy degenerate into a controversy about matters of no consequence.

"Other clubs than our own have taken up the consideration of the matter and have appointed committees. It has been suggested that these committees act together if possible through correspondence and conference by representatives if practicable, with a view to a joint memorial to express to Congress our view of the matter and a draft of the legislation required to carry that view into practical effect.

"Your committee, therefore, asks to be continued, and for authority to confer with the representatives of other engineer societies, clubs or associations with a view to concert of action, but without power to pledge this club to anything.

ROBERT E. MCMATH,
J. B. JOHNSON,
H. S. PRITCHETT,
J. A. OCKERSON,
*Committee.*"

By vote of the Club the committee was continued and the authority asked was granted.

Mr. Frank H. Pond read a paper on Pumping Machinery and Water Works.

The paper was discussed by Messrs. Moore, Johnson, McMath and Seddon.

The Club then adjourned.

### Engineers' Club of Philadelphia.

A business meeting was held in Philadelphia, May 2, President J. J. de Kinder in the chair; 45 members and 5 visitors present.

The Secretary reported that the house No. 1122 Girard street had been secured for the Club, and that the board of directors were taking such action as would enable the Club to occupy it at an early day.

The Tellers reported the following gentlemen elected active members of the Club: Messrs. Harry B. Hirsh, Geo. B. Price, Louis Schutte, Max Livingston, John L. Gill, W. F. Dodge, S. P. Mitchell, Wm. H. Burr, Heber S. Thompson, Wm. J. Hoyt and Frank H. Taylor.

Prof. L. M. Haupt, Chairman of Committee appointed at last meeting to prepare a Memorial to the Legislature of Pennsylvania upon the Continution of the Second Geological Survey of the State, presented the following report from that Committee:

"*To the Honorable Lieutenant Governor Chauncey F. Black, President, and the Honorable Amos H. Mylin, President pro tem. of the Senate, and the Honorable James L. Graham, Speaker of the House of Representatives of Pennsylvania:*

"*Whereas*, The Engineers' Club of Philadelphia recognize the gross errors and discrepancies which exist in all of the best maps which have been constructed of Pennsylvania and of individual counties in the state, which have been published since 1816, and which are based upon Melish's State Map, constructed under authority of the Legislature of that year; and

"*Whereas*, There is a great demand among those citizens of the state interested in all surface improvements and in the development of the natural resources of the state, for an accurate map, which shall establish the true geographical position of every point on its surface north and south, and east and west from every other point, and the elevation of all points above tide, so that the citizens of the commonwealth shall have correct maps of their respective townships and counties on which surface improvements may be outlined, and upon which surveyors can place land lines, and mining engineers and geologists can trace mineral outcrops and areas; and

"*Whereas*, The Board of Commissioners of the Geological Survey have entered into negotiations with the United States Geological Survey, and the United States Coast and Geodetic Survey, and a plan of co-operation has been proposed by which the United States surveys will expend in the state for a geographical and topographical survey $35,000 a year, if the state will expend $10,000 a year, and which co-operation now depends upon the granting of a state appropriation by the Legislature in accordance with the recommendations of the Board of Commissioners; and

"*Whereas*, Such state maps are now being constructed by New York, Massachusetts and New Jersey; it is, therefore,

"*Resolved*, By the Engineers' Club of Philadelphia, that they respectfully petition your honorable bodies to speedily pass House Bill 497, entitled 'An Act to provide for the continuance of the Geological Survey of the State,' as originally introduced and committed to the Appropriation Committee of the House of Representatives, wherein an appropriation of $90,000 is asked, $20,000 of which provides for the continuance of topographical work and the commencement of the construction of an accurate map of the state, and your petitioners will ever pray."

Upon motion of the Secretary, the report and resolutions were unanimously adopted and the Chairman of the Committee empowered to forward the same, in proper form, to the Senate and House and to the individual members thereof.

The Secretary announced that he had referred the recently-offered amendments to the by-laws to the committee which now has the complete revision of the by-laws in charge, and is actively pushing its work to completion.

Mr. T. Everett Austin presented a paper on Fast Passenger Locomotives—giving a description of Locomotive No. 169 of the Central of New Jersey, also of the Class K, Pennsylvania Railroad, and of Type D 33, Wootten passenger locomotive—designed for fast passenger service between New York and Philadelphia. He also exhibited photographs of the locomotives "G. F. Ward," for the Buffalo, New York & Philadelphia, and of the "Pegasus," for the Boston & Lowell, built at the Rhode Island Locomotive Works; also the principal dimensions of the latest design of passenger locomotives built at the Mason Locomotive Works, closing the paper with a description, illustrated by a blue print, of a new design for a fast passenger locomotive. Some of the peculiarities of this engine are: first, in carrying the four-wheeled truck entirely in front of the cylinders and connecting to the back drivers, the object being to get the weight of the cylinders nearly all on the drivers; another departure is in carrying the twin fire-boxes on a trailing wheel behind the drivers. This arrangement secures about 250 square feet of heating surface in the fire-boxes and combustion chamber, while the centre of the boiler is no higher than would be the case with an ordinary eight-wheeled engine.

Mr. Kenneth Allen presented extracts from a paper by Henry J. Barnes, M. D., on Purification of Sewage by application to land, with especial reference to the city of Boston. A discussion followed.

Mr. W. F. Newell, member of Civil Engineers' Society of St. Paul, introduced by Prof. Haupt, presented a description of the Borup Coal Chute, which is designed to prevent accidents to pedestrians in street openings, for convenience in receiving or removing material, and for ventilation of cellars and vaults. It consists of a cylindrical sheet-iron tube, open in front, to permit the dumping or throwing in of the coal,

It is raised to about 18 in. above the sidewalk, by means of two lugs cast on the under side of the lid, which fit and lock in openings cut in top of chute, to prevent the removal of the lid without raising the chute above the elevation of the sidewalk. After a slight turn, the lid is taken off, and the throwing in of the coal commenced. When finished, the lid is put in place on top of chute, the reverse turn given, which locks lid to chute, and allows the latter to be lowered to grade of pavement. The lid cannot be removed without raising the chute; and when the chute is lowered, the lid is secured and cannot tilt, as can ordinary covers, when carelessly replaced.

### Coal Used in Iron-Making.

It has been the habit of some writers in dealing with the state of the coal trade to refer from time to time to the condition of the iron industry of the United States, as a reason for the dullness of coal (when it is dull), and to venture the assertion that coal must suffer terribly from the depression in iron. We have said that the iron trade used but a small proportion of the anthracite output, and now find some interesting figures prepared by Mr. J. M. Swank, which fully corroborate all we have said on this subject. Taking last year's statement, Mr. Swank makes the following figures, which must prove of great value to all who wish to be properly informed on this subject:

| Fuels. | Blast furnaces. | Other works. | Total. |
|---|---|---|---|
| Coke, gross tons | 3,697,275 | 135,895 | 3,833,170 |
| Anthracite, gross tons | 1,543,688 | 429,617 | 1,973,305 |
| Bituminous, gross tons | 326,986 | 3,900,000 | 4,226,986 |
| Charcoal, bushels | 50,5:7,153 | 11,533,507 | 62,110,660 |

On the average, a ton of pig iron is made made with 1.52 tons of anthracite, and with 1.36 tons of bituminous coal and coke.—*Coal Trade Journal.*

The proportion of the total anthracite production used in iron making was 6.4 per cent. That of bituminous was much smaller; how much cannot be exactly said. But while the proportion of the whole bituminous output used in making iron is small, the furnaces and rolling mills take a very large part of the output of several of the few districts which make regular reports of production, so that the effect of dullness in the iron trade on the statistics published from month to month is considerable. Coke is distinctively the fuel of the iron trade, and is growing to be more so every year, so that the coke output may be said to depend in great measure upon the prosperity of the iron interest.

### A Great Bridge for Australia.

A great railroad bridge, 3,000 ft. long, is to be built over the Hawkesbury River, in New South Wales, Australia. The soundings appear to show that the foundations for piers must be sent down to a greater depth than any ever sunk by man in the whole history of engineering, the water in some places being 77 ft. deep, and in others, where the water is 45 ft. deep, the mud and sand is 125 ft. deep, making 170 ft. in all, to sink the piers below tide.

This bridge is to be for double tracks, and will cost over $2,000,000. Proposals to build this great bridge have been asked of the leading bridge-builders of England, Europe and the United States. Sir Saul Samuel, of London, on the part of the government, has named a board of engineers, to meet in London in June to examine and report on the plans and tenders sent in by the bridge builders. The board named consists of Sir John Hawkshaw, C. E., Col. Douglas Galton and Mr. W. W. Evans, M. I. C. E., of New York. Mr. Evans is just recovering from an attack of pneumonia and cannot avail himself of the honor thus conferred on him. This is the first time that an American engineer has been asked to serve on such a board in England, and it is to be regretted that Mr. Evans is unable to act.

### Concrete Arches.

Two concrete arches of considerable boldness recently constructed in Aarau, over a canal, afford an interesting indication of what can be done with that material. The dimensions of the arches are: Span, 39 ft. 4 in.; rise, 6 ft. 6¾ in.; thickness at crown, 1 ft. 7¾ in.; thickness at abutment, 3 ft. 3½ in.; thickness of abutments, 9 ft. 10 in.; width of roadway, 13 ft. 1½ in. The foundation was fairly good gravel, at a depth of about 5 ft. below the springing. Spandril walls were carried up to the level of the roadway, the space between being filled in with gravel covered with ordinary road metaling. The total weight of the structure between the abutments is 194 tons of 2,240 lbs., or, including a live load of 61.5 lbs. per square foot, 211 tons. The first bridge was erected in two days, the abutments being formed on the first, and the arch and spandril walls on the second day. The bridge was brought into use after standing for about two months, and has been in constant service ever since for heavy-wheeled traffic, without any sign of failure. The second bridge was completed between 6 a. m. and 6 p. m., by 65 men. The concrete was proportioned:

| | Cement, vol. | Sand, vol. | Gravel, vol. | Pounds of cement per cubic yard of concrete. |
|---|---|---|---|---|
| Abutments | 1 | 3 | 7 | 337.2 |
| Arch | 1 | 2 | 4 | 505.8 |
| Spandrils | 1 | 2 | 6 | 421.5 |

The cost is given as follows:

| | |
|---|---|
| Excavation (65 cubic yards) | $11.00 |
| Concrete, including centring, etc, 104 cubic yards at $4.67 | 486.00 |
| Filling-in over arch, forming road | 40.50 |
| Iron hand-railing | 50.80 |
| Total (one bridge) | $588.30 |

### A Russian Ship Canal.

The St. Petersburg Ship Canal, which is now completed and ready for business, was begun in 1878. This canal is from Cronstadt to St. Petersburg, its total length 17¾ English miles, with greatest width 350 ft., diminishing to 220 ft., and navigable for vessels drawing 20½ ft. of water. The force employed upon its construction embraced 3,500 men, 13 dredging machines, 3 locomotives, with 230 cars, 86 lighters and barges, 12 steam tugs and 7 stationary engines, and its total cost to the government was about $9,000,000, or $500,000 per mile. When the Neva River is free from ice (which is generally by May), vessels can proceed directly from the Gulf of Finland to St. Petersburg, instead of discharging or taking their cargo at Cronstadt, as heretofore. The temporary rules for using the St. Petersburg Canal are as follows:

"1. Steamers and sailing vessels coming to Cronstadt can use the canal, provided their draft of water does not exceed 20½ English ft.; if exceeding 20½ ft., vessels will have to lighten part of their cargo at Cronstadt, and can then proceed with a draft as well.

"2. All sailing vessels and lighters have to be towed through the canal, but the tow-boat is never allowed to to fasten alongside of a vessel.

"3. Passing through the canal is only permitted during the day; vessels being already in the canal have to go to anchor at night, or during a fog, and can proceed with daybreak or clearing weather.

"4. A permit to pass through the canal will be issued at the Cronstadt custom-house; the same is free of charge until a tariff has been fixed by the Government.

"5. Every vessel must take a pilot, and full tariff rates will be charged if without a pilot.

"6. Vessels with petroleum, naphtha and other inflammable goods are subject to certain precautionary measures, and can only enter the canal upon a special permit from the custom-house at Cronstant.

"The permanent rules and charges on vessels will be supplied when they are all received."

### Safety Valve Patents.

Another step has just been taken in the protracted litigation in regard to the Richardson safety valve patents, the validity of which has been recently established by the United States Supreme Court. On April 4 the Consolidated Safety Valve Co., of Boston, owner of the Richardson patents, filed a bill in the United States Circuit Court here for an injunction and accounting against the Union Brass Manufacturing Co., of Chicago. Yesterday a final decree was entered by Judge Blodgett by agreement of the parties, awarding the complainants the sum of $10,000 as profits and damages on account of the infringement by the defendants of the Richardson patents of 1866 and 1869. An injunction was also granted against the Union Brass Manufacturing Co. on the Richardson letters patent of 1869. R. L. Tatham appeared for the complainants, and Raymond & Rainey for the defense.—*Chicago Inter-Ocean, April 22.*

### Electric Train Signals.

For the past week the 9:25 a. m. train on the Boston & Providence Railroad has been running with an electric substitute for the bell cord, and so satisfactorily has it worked that a company of railroad and newspaper men were yesterday invited to witness its operation. Other cars were substituted for the regular ones on the 9:25 train, and the latter were run as a special to Readville, leaving Boston at 1:05 p. m. The train consisted of a locomotive, baggage car, smoker and three passenger coaches, all of which were equipped with the new invention. It is known as the Judkins railway train signal, being the invention of Mr. Henry E. Judkins, a well-known conductor on the Maine Central road, his experience with bell ropes having convinced him of their dangerous and unreliable character. The invention consists of an open circuit battery on the locomotive, from which runs an insulated wire, which is permanently attached to each car, a simple but effective automatic coupler connecting the wires between the cars. In each car are located push knobs, upon pressing which a signal is instantly sounded in the locomotive cab. Knobs are also placed under each corner of the cars for convenience of the conductor in signaling the engineer to start the train. Of course by an understood system of signals, the conductor can communicate various orders to the engineer. At the exhibition of the appliance, yesterday, its instantaneous working was demonstrated when the train breaks apart, when the conductor desires to signal the engineer to stop at the next station, or when for any reason it should get out of order. A large number of railroad men were present at the test. The invention has been in use on the Maine Central for six months, and General Manager Payson Tucker declares "it has been demonstrated beyond question that it is a perfect signal, never failing to work satisfactorily," and the test of yesterday would tend to sustain his declaration.—*Boston Herald, May 16.*

## General Railroad News.

### MEETINGS AND ANNOUNCEMENTS.

#### Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Burlington, Cedar Rapids & Northern*, annual meeting, at the office in Cedar Rapids, Ia., May 26.

*Chicago, Milwaukee & St. Paul*, annual meeting, at the office in Milwaukee, Wis., June 10, at noon.

*Chicago & Northwestern*, annual meeting, at the office in Chicago, June 4.

*Chicago, St. Paul, Minneapolis & Omaha*, annual meeting, in Hudson, Wis., June 6.

*Concord*, annual meeting, at the Opera House in Concord, N. H., at 11 a. m., May 26.

*St. Louis, Alton & Terre Haute*, annual meeting, at the office in St. Louis, at 2:30 p. m. on June 1.

#### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

*North Pennsylvania* (leased to Philadelphia & Reading), 2 per cent., quarterly, payable May 25, to stockholders of record on May 13.

#### Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car-Builders' Association* will hold its annual convention at the Hygeia Hotel, Old Point Comfort (Fortress Monroe), Va., beginning on Tuesday, June 9.

The *Yardmasters' Mutual Benefit Association* will hold its annual convention in Philadelphia, on Wednesday, June 10.

The *Master Mechanics' Association* will hold its annual convention in Washington, beginning on Tuesday, June 16.

The *American Association of Train Dispatchers* will hold its annual convention in Denver, Col., on Tuesday, June 16.

The *Car Accountants' Association* will hold its annual convention in Minneapolis, Minn., beginning on Tuesday, June 23.

*The American Society of Civil Engineers* will hold its annual convention at Deer Park, Md., beginning on Wednesday, June 24.

The *General Baggage Agents' Association* will hold its half-yearly meeting in St. Paul, Minn., on Wednesday, July 15.

The *National Association of General Passenger & Ticket Agents* will hold its next half-yearly meeting in New York, at 11 a. m., on Tuesday, Sept. 15.

#### Foreclosure Sales.

The *Union Canal* was sold May 19, under foreclosure by the bondholders, and was bought by the Philadelphia & Reading Railroad Co., which holds about two-thirds of the bonded debt, for $6,000. The Union Canal has been controlled and operated by the Reading for many years. It connects the Schuylkill and Susquehanna Rivers.

#### American Ticket Brokers' Association.

The American Ticket Brokers' Association held its annual meeting in St. Louis, May 13. The Secretary's report showed that the membership, May 1, 1884, was 107. Thirty-four members were admitted during the year, 17 had withdrawn and 1 was expelled, making the present membership 123. These members have agencies in 84 cities. The report sets forth the advantages secured by the Association at much length. The usual routine business was transacted, and the meeting closed with a dinner and other festivities.

### ELECTIONS AND APPOINTMENTS.

*American Institute of Electrical Engineers.*—At the annual meeting in New York, May 19, this association elected the following officers: President, Dr. Norvin Green; Vice-Presidents, D. H. Bates, Prof. A. E. Dolbear, Francis W. Jones; Managers, Charles L. Buckingham, David Brooks, T. C. Martin, George M. Phelps, Jr., Prof. B. F. Thomas, W. D. Sargent; Treasurer, Col. Rowland R. Hazard; Secretary, Ralph W. Pope.

*American Society of Civil Engineers.*—At the regular meeting of April 1, the following candidates were elected members: Andrew Bryson, Norwalk, Conn.; Matthew Joseph Butler, Napanee, Canada; Edwin Peleg Dawley, Providence, R. I.; William Durfee Gallette, San Francisco, Cal.; Helidore John Hilbert, Milwaukee, Wis.; Louis Roberts Walton, Earlington, Ky.; Frank Wallace Whitlock (transferred from junior), Waterbury, Conn.

At the meeting of May 6 the following candidates were elected as members: Clifford Buxton, Toledo, O.; Richard Morley Harrison, Liverpool, England; John Franklin Hinckley, North Springfield, Mo.; Olaff Hoff, Pittsburgh, Pa.; Edmund Dorman Libby, St. Louis, Mo.; Robert Henry Temple, Richmond, Va.; Theodore Voorhees, Ballston Spa, N. Y. As junior, David Coley Sanford, New Haven, Conn.

*American Ticket Brokers' Association.*—At the annual meeting in St. Louis last week the following officers were chosen for the ensuing year: President, O. P. Blake, Davenport, Iowa; First Vice-President, F. T. Lindenburger, Detroit; Second Vice-President, D. M. Fulwider, New York; Third Vice-President, C. R. Kimball, Minneapolis; Fourth Vice-President, John M. Schiely, Cincinnati; Secretary and General Manager, H. C. Meader, Louisville; Treasurer, George W. Frey, Indianapolis. Executive Committee, Gustav G. Lansing, New York, Chairman; L. Salomon, Chicago; John Doherty, Kansas City; John E. Walsh, Buffalo, and the President. Arbitration Committee, E. A. Mulford, Chicago, Chairman; J. J. Walser, Chicago, and R. T. Sheckells, Quincy. Auditing Committee, M. W. Bailey, Chairman; Will. Clough and L. Samuelson.

*Baltimore & Ohio.*—Mr. James McC. Creighton is appointed Superintendent of the Baltimore & Philadelphia Division, and will be also Vice-President of the Schuylkill River East Side Co.

Mr. H. P. Harris has been appointed Superintendent of the Pittsburgh Division. He was formerly Superintendent of Transportation of the main line between Cumberland and Wheeling.

*Baltimore & Ohio Leased Lines.*—Directors for leased lines of this company have been elected as follows: *Ohio & Baltimore Short Line.*—President, Thomas M. King; Secretary, J. B. Washington; Treasurer, W. H. Ijams. *Somerset & Cambria.*—President, J. B. Washington; Secretary, F. R. Pinkerton; Treasurer, W. H. Ijams.

*Buffalo, New York & Philadelphia.*—Mr. G. Clinton Gardner has been appointed Receiver. He is President of the company.

*Burlington, Cedar Rapids & Northern.*—At meetings held in Cedar Rapids, Ia., May 6, officers for this company's leased lines were chosen as below: *Cedar Rapids & Clinton.*—President, C. J. Ives; Vice-President, J. C. Broeksmit; Secretary, W. P. Brady; Treasurer, S. S. Dorwart; Chief Engineer, H. F. White. *Cedar Rapids, Iowa Falls & Northwestern.*—The same. *Chicago, Decorah & Minnesota.*—The same. *Iowa City & Western.*—The same.

*Central Vermont.*—At the annual meeting in St. Albans, May 20, the following directors were chosen: Edward C. Smith, J. Gregory Smith, St. Albans, Vt.; W. H. H. Bingham, Stow, Vt.; James R. Langdon, Montpelier, Vt.; Joseph Hickson, Montreal; Ezra H. Baker, B. P. Cheney, Boston.

*Charleston & Pittsburgh.*—The directors of this new company are J. D. Cameron, Wayne McVeigh, A. Brockerhoff, J. N. Camden and Francis V. Green.

*Chicago, Burlington & Quincy.*—Mr. E. A. Sadd has been appointed General Baggage Agent in place of M. B. Starring, resigned. Mr. Sadd has been for a long time conductor on the road.

*Chicago, St. Louis & Nashville.*—The directors of this new company are A. L. Blackman, Wm. A. Lumma, John S. Crumm, Wm. O. Towle, H. Clay Conde, Charles A. M. Schlierholz and Richard L. Miller.

*Cincinnati & Eastern.*—Mr. W. L. King is appointed Chief Engineer and General Roadmaster.

*Cincinnati, New Orleans & Texas.*—Mr. G. Bouscaren, for a long time past Chief Engineer, has retired from that position, but is still connected with the company as Consulting Engineer. Mr. G. B. Nicholson succeeds Mr. Bouscaren as Chief Engineer.

*Cleveland, Delphos & St. Louis.*—At the recent annual meeting in Delphos, O., the following directors were chosen: David Straw, D. Evans, W. H. Fuller, James M. Semple, James Callery, Wm. Semple, W. C. Nobley, J. D. Callery and A. W. Jones.

*Columbus & Cincinnati Midland.*—Mr. J. A. Conant has been appointed Car Accountant for this Company, with office at Grand Central Depot, Cincinnati.

*Consolidated Railroad Co., of Vermont.*—At the annual meeting in St. Albans, Vt., May 20, the following directors were chosen: Ezra A. Baker, W. H. H. Bingham, B. P. Cheney, Joseph Hickson, James R. Langdon, Edward C. Smith, J. Gregory Smith.

*Dallas & Northwestern.*—The officers of this new company are: T. L. Marsalis, President; A. J. Porter, Secretary; W. H. Lemon, Assistant Secretary; A. W. Childress, Treasurer. Office in Dallas, Texas.

*Detroit, Lansing & Northern.*—At the annual meeting held in Detroit, May 13, the following directors were chosen: Alpheus Hardy, H. H. Hunnewell, Geo. O. Shattuck, C. L. Young, Chas. Merriam, C. F. Adams, Jr., N. Thayer, J. H. Blake, A. H. Hardy, J. A. Burnham and E. V. R. Thayer, all of Boston.

*Eastern Railroad Association.*—The following officers have been elected for the ensuing year: President, Wm. D. Bishop; Vice-President, Theodore N. Ely; Treasurer, A. A. Folsom; Secretary and General Counsel, Andrew McCallum.

*Elberton Air Line.*—At the recent annual meeting held in Toccoa, Ga., the following directors were chosen: Thomas J. Bowman, R. M. Heard, L. L. McLeskey, E. Berkley, James Wilson, C. W. Feurer and R. Brooks. The board elected John H. Jones, President; A. S. Buford, Vice-President; R. Brooks, Secretary and Treasurer.

*Fort Bragg.*—The dieectors of this new company are: Otis R. Johnson, John C. Huggins, Charles E. Wilson, Calvin Stewart, Charles R. Johnson and James Hunter. Office in San Francisco.

*Fort Smith, Wellington & Northwestern.*—The directors of this new company are: P. A. Wood, F. P. Neal, John Murphy; John T. Stewart, M. V. B. Holmes, A. Graff, of Wellington, Kan.; Silas Beal, Sumner, Kan.; C. R. Mitchell, Gueda Springs, Kan.; H. M. Cramer, Conway Springs, Kansas.

*Indianapolis & Vincennes.*—At the recent annual meeting in Indianapolis the old board, as follows, was re-elected: J. N. McCullough, George B. Roberts, William Thaw, W. Barnes, T. D. Messler, William Mullens, J. A. Perkins.

*Lake Erie & Western.*—The directors of this company as consolidated are: C. R. Cummings, Chicago; J. H. Cheney, Bloomington, Ill.; Calvin S. Brice, Lima, O.; Daniel Eels, Cleveland, O.; E. H. R. Lyman, John T. Martin, Brooklyn, N. Y.; Wm. Fleiss, Frank C. Hollins, Arthur J. Moulton, Nelson Robinson, A. M. White, New York.

*Louisville, Evansville & St. Louis.*—At the annual meeting held at Mount Carmel, Ill., May 13, the following directors were elected: Jonas H. French, Gloucester, Mass.; Isaac T. Burr, John Goldthwait, F. B. Taylor, H. C. Nutt, Wm. T. Hart, T. B. White, Boston; James H. Wilson, Wilmington, Del.; Bluford Wilson, Springfield, Ill.; St. John Boyle, Jas. M. Fetter, Bennett H. Young and C. Brockerbrough, Louisville, Ky.; E. C. Rice, St. Louis; Morris McDonald, New Albany, Ind.; Samuel Bayard, William Hillman, Evansville, Ind.

*Marquette, Houghton & Ontonagon.*—The full list of the officers of this road is now as follows, all the resent changes being included: General Manager, John Hornby; Cashier, W. B. McCombs; General Ticket Agent, W. B. McCombs; General Freight Agent, A. S. Parks; Auditor, C. G. Gay; Chief Engineer, C. H. V. Cavis; Master Mechanic, W. G. Mahan; Master Car-Builder, H. D. Lyons; Master of Bridges and Buildings, Geo. W. Joslin; Superintendent of Docks, John W. Murphy; Trainmaster, L. S. Glasier; Train Dispatcher, Clarence C. Spooner; Supply Agent, W. B. McGee; Assistant Superintendent, W. A. Thompson.

*Minneapolis Union.*—This company recently elected J. J. Hill President; A. Manvel, Vice-President; H. V. Dugan, Secretary; Edward Sawyer, Treasurer.

*Missouri Pacific.*—The following circular has been issued: "J. W. Haines having resigned, Wm. E. Phillips is appointed Master Mechanic, with headquarters at Parsons, Kan., to take effect May 11, 1885. His jurisdiction will commence at the north switch at Denison, Tex., and extend over the Denison, Cherokee, Neosho, Parsons and Hannibal sections, and the Warsaw and Lehigh branches."

The jurisdiction of Mr. A. C. Van Valkenberg as Car Accountant has been extended over all lines operated and controlled by the company.

*Mount Washington.*—At the annual meeting in Concord, N. H., May 13, the following directors were chosen: John H. George, N. H. White, Jr., John M. Mitchell, Concord, N. H.; Emmons Raymond, J. Thomas Vose, Boston; Walter Aiken, A. W. Sulloway, Franklin, N. H. The board organized with J. H. George as President; F. E. Brown, of Concord, Clerk; Edward D. Harlow, of Boston, Treasurer.

*New York & Harlem.*—At the annual meeting held in New York, May 19, the following directors were elected: William H., Cornelius, William K. and Frederick W. Vanderbilt, Samuel F. Bangs, Chauncey M. Depew, William H. Leonard, John E. Burrill, Robert J. Nevin, John B. Dutcher, Joseph Harker, Charles C. Clarke and Francis P. Freeman. The last named was elected in place of James H. Banker, and is the only change in the board from last year.

*Northern Central.*—Mr. Edward D. Nelson is appointed Superintendent of Motive Power in place of A. O. Dayton, promoted.

*Osage Valley.*—The directors of this new company are: I. P. Dana, W. E. Dunn, J. H. Emmet, J. S. Ford, George H. Nettleton, Wallace Pratt, and L. W. Towne, all of Kansas City.

*Pennsylvania.*—Mr. Edward D. Nelson is appointed Superintendent of Motive Power of the Philadelphia & Erie Division in place of A. O. Dayton, promoted.

*Pennsylvania Railroad Leased Lines.* — Elections were held May 12 with the following results: *Philadelphia & Lehigh Valley.*—President, J. N. DuBarry; directors, John P. Green, George B. Roberts, N. P. Shortridge, Edmund Smith, Henry D. Welsh, J. P. Wetherill. *Pennsylvania & Schuylkill Valley.*—President, J. N. DuBarry; directors, John P. Green, Wistar Morris, N. P. Shortridge, Edmund Smith, Henry D. Welsh, J. P. Wetherill.

*Pittsburgh, Fort Wayne & Chicago.*—At the annual meeting in Pittsburgh, May 20, the following directors were chosen: J. L. Williams, Fort Wayne, Ind.; Charles E. Speer, Pittsburgh, Pa.; L. H. Meyer, New York.

*Providence, Warren & Bristol.*—Mr. E. Holmes has been appointed General Passenger Agent, with office in Providence, R. I., in place of S. A. Perkins, transferred.

*Saginaw & Western.*—At the annual meeting held in Detroit, May 13, the following directors were chosen: James H. Blake, John A. Burnham, Alpheus Hardy, Chas. Merriam, Geo. O. Shattuck, N. Thayer, E. V. R. Thayer, Chas. L. Young and C. F. Adams, Jr. The road is controlled by the Detroit, Lansing & Northern.

*Texas Trunk.*—At the annual meeting held in Dallas, Tex., May 13, the following directors were chosen: Alex. Sanger, T. L. Marsalls, R. V. Tompkins, L. A. Pires, J. E. Schneider and W. H. Keller.

*Union Pacific.*—Mr. John Rapelje (late Assistant Engineer on New York, Lake Erie & Western) has been appointed General Roadmaster of the Denver, South Park & Pacific Division. Mr. J. P. Schermerhorn has been appointed Roadmaster (in place of Mr. Murphy) on Gunnison end of same division.

*Utah Central.*—At the annual meeting in Salt Lake, Utah, the following directors were chosen: Sidney Dillon, Henry McFarland, Charles F. Adams, Jr., Frank G. Brown, Frederick L. Ames, William Jennings, John Sharp, Feramorz Little, John S. Tebbets.

*Western Freight Association.*—Mr. J. A. Faithorn has been chosen Commissioner of this new association. He has been for several years in Commissioner Midgley's office.

*Woodruff Sleeping & Parlor Coach Co.*—Mr. R. A. Rutherford is appointed Assistant Superintendent of this company with headquarters at Philadelphia, vice W. W. Green; to date from May 9.

## PERSONAL.

—Mr. Mason B. Starring has resigned his position as General Baggage Agent of the Chicago, Burlington & Quincy road, and will go into private business in Chicago.

—Mr. A. T. Cochran, the oldest agent along the Erie road, died at Corning, N. Y., Thursday, May 14. Mr. Cochran was 61 years of age, and had been agent for the company 33 years. He shipped the first freight ever sent west from Corning.

—Mr. F. F. Hagadorn, Superintendent of Bridges and Building of the Lake Erie & Western road, died in Lafayette, Ind., May 11. His death was caused by consumption, contracted from exposure while in the performance of his duties on the road.

—Mr. Edmund E. Clinton, who died at Brodhead, Wis., May 6, aged 80 years, was one of the most active agents in the original construction of the Chicago, Milwaukee & St. Paul road. He served for more than 20 years as a director, and for some years as General Agent of the road, but retired several years ago.

—Mr. Philip Street, Superintendent of Motive Power of the Lehigh & Susquehanna Division of the Philadelphia & Reading road, was killed May 16, in a collision on that road. Mr. Street was making a trial trip on a new locomotive just completed at the Ashley shops, when, through a train dispatcher's mistake, the locomotive came into collision with a freight train.

—Mr. Norman C. Munson died suddenly at his office in Boston, May 16, of *angina pectoris*. Of him the Boston *Advertiser* says: "Mr. Munson was born in Poultney, Vt., about 65 years ago, and spent his early days on a farm. He came to Boston when quite a young man, and went to work upon the Boston & Worcester Railroad as Superintendent of tracklaying. When the Fitchburg Railroad was being built he took a contract to do the work, and took up his residence at Shirley. By the time he had finished the road four of his children had died. For this reason he continued to live at Shirley up to his death. He built the town hall there, and also an elegant gateway for the cemetery. He also laid out a park for the town. His next large operation was the building of the second track of the Hudson River Railroad. Upon its completion he went to Baltimore and engaged in some large work for that city, in company with a man named Goss, the firm name being Munson & Goss. After a year both came to Boston and took a large contract for filling in the Back Bay, both for the state, city and Boston Water Power Co. It was by this piece of work that he was best and widest known. Mr. Goss was interested in this contract, but after a short time he sold out to Mr. Munson, who put all his means into it. He prosecuted the work with vigor from 1859 to 1873, or until the panic. At one time it was estimated that he was worth $3,000,000, but through unfortunate land speculation and the misfortunes of the Massachusetts Central Railroad it was greatly lessened. Mr. Munson was President of the Norfolk County Railroad, which was merged into the old Boston, Hartford & Erie. He put a great deal of money into it, and when Governor Claflin vetoed the bill giving the road state aid, the road owed him $1,040,000. In 1873 he had a large amount of money in the Massachusetts Central Railroad. When the panic occurred, Jay Cooke, who was the banker who was to dispose of the bonds, was unable to do so, and Mr. Munson's operations on the railroad and the Back Bay came to a close. He struggled on until 1876, when he went into bankruptcy. In 1879 he reorganized the Massachusetts Central Railroad, and began the work of construction in 1880, and continued until the failure of Charles A. Sweet & Co., bankers. Mr. Munson at the time of his death was engaged in building the Florida Southern Railroad. At different times he was interested in contracts for the Hoosac Tunnel, the Wells River Railroad, the St. Johnsbury & Lake Champlain, the West Shore, the Hartford & Erie and the Fitchburg Railroad. The Huntington Avenue Syndicate, organized in 1871, was also one of his gigantic enterprises. This involved a capital of $1,700,000. Among his associates were Alexander H. Rice, then Governor; Franklin Haven and Peleg W. Chandler, who were then and are now trustees of the syndicate. Mr. Munson was held in high respect by all who knew him. He was a man of genuine benevolence, and was constant in his consideration for the poor and needy of his own town, and he will be greatly lamented by his townspeople as a public-spirited citizen and a kind neighbor and friend. He served one term in the Legislature as the representative of the town."

## TRAFFIC AND EARNINGS.

### Southern Fruit Traffic.

The Nashville, Chattanooga & St. Louis Co. has made arrangements for a fast special train to carry fruit and vegetables from Chattanooga to Cincinnati and Chicago during the season. The rates will depend somewhat upon the number of car-loads shipped.

### The Railway Car Association.

The following circular from C. W. Cushman, Manager, is dated Buffalo, N. Y., May 13:

"Please report the Junction movements of all the Arms palace horse cars, Nos. 10, 20, 30, 40, and so on, up to 300, inclusive, to this office. All mileage made by these cars, please settle direct with me. Also any mileage made previous to May 1 you may have upon your books, and not already reported."

### Cars Destroyed or Damaged on Private Tracks.

The following circular has been issued from the office of the General Manager of the Richmond & Danville and its controlled lines:

"Notice having been received from several railroad companies that they decline to accept the responsibility provided for in Rule No. 20 of the Master Car-Builders' Association rules, which is as follows:

"'RULE 20—When a car is damaged or destroyed on a private track, the railroad company delivering the car upon such track shall be responsible to the car owner for the making good the damage by the owner of the private track.'

"Notice is hereby given to all railroad companies into whose possession the cars of these companies may come, not to place the cars of any one of these companies in any position whatever where the company placing said cars declines to accept the responsibility for their safe care. Railroad companies receiving cars of these companies in the interchange of traffic, or otherwise, will be held accountable for the same until they are delivered to a responsible railroad or transportation company.

"The attention of all railway companies declining to accept the responsibility provided for by said Rule No. 20 is especially called to this notice."

### New Through Lines.

A meeting was held in St. Louis, May 12, to arrange for the formation of a through line between Kansas City and New Orleans. The roads represented were the St. Louis & San Francisco, the Little Rock & Fort Smith, the Little Rock, Mississippi River & Texas, and the New Orleans & Northeastern. Arrangements for through freight service were made, and it is expected that through passenger service will be commenced soon.

The Wisconsin Central is arranging for a new line between St. Paul, Detroit and Eastern points, in connection with the Flint & Père Marquette, connection to be made between the two roads by steamboat between Green Bay and Ludington. It is expected that fast time can be made by this line, and fast boats will be provided for the lake service.

### Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

| | 1885. | 1884. | Inc. or Dec. | P. c. |
|---|---|---|---|---|
| *Four months ending April 30:* | | | | |
| Ala. Gt. South... | $383,375 | $359,052 | I. $24,323 | 6.8 |
| Char., Col. & A.. | 289,993 | 271,355 | I. 18,638 | 6.8 |
| Cin., N. O. & T. P. | 814,045 | 784,988 | I. 29,057 | 3.7 |
| Col. & Greenville. | 251,197 | 234,069 | I. 17,128 | 7.3 |
| Denver & R. G. Western ..... | 263,301 | 230,605 | I. 32,696 | 14.2 |
| Des M. & Ft. D.. | 114,168 | 107,348 | I. 6,820 | 6.4 |
| Fla. Ry. & N. Co. | 354,502 | 354,177 | I. 325 | 0.1 |
| Georgia Pacific. | 220,099 | 172,987 | I. 47,112 | 27.2 |
| N. O. & Nor'east. | 241,695 | 133,204 | I. 108,491 | 81.5 |
| Rich. & Dan .... | 1,297,202 | 1,273,954 | I. 23,248 | 1.9 |
| Texas & St. L.... | 305,988 | 224,824 | I. 81,164 | 36.1 |
| Vicks. & Mer..... | 147,030 | 163,582 | D. 16,552 | 10.1 |
| Vicks., Shreve. & Pacific..... | 111,314 | 44,422 | I. 66,892 | 150.6 |
| Va. Midland ..... | 449,138 | 466,909 | D. 17,771 | 3.8 |
| Western N. C.... | 143,802 | 129,183 | I. 14,619 | 11.3 |
| *Three months ending March 31:* | | | | |
| Central Pacific... | $4,412,762 | $4,325,041 | I. $87,721 | 2.0 |
| Net earnings... | 1,288,006 | 588,649 | I. 699,357 | 118.7 |
| Cin., Ind., St. L. & Chi..... | 597,174 | 494,153 | I. 103,021 | 20.9 |
| Net earnings... | 253,025 | 198,119 | I. 54,906 | 27.7 |
| Cleve., Col., Cin. & Ind ..... | 803,408 | 896,901 | D. 92,493 | 10.3 |
| Dan. & Norwalk. | 44,023 | 39,296 | I. 4,797 | 12.3 |
| Lake Shore & M. Southern..... | 3,235,071 | 3,684,021 | D. 448,950 | 12.2 |
| Net earnings,.. | 896,593 | 1,353,190 | D. 456,597 | 33.8 |
| *Month of March:* | | | | |
| Central Pacific.. | $1,477,387 | $1,472,785 | I. $4,602 | 0.3 |
| Net earnings... | 392,204 | 170,879 | I. 221,325 | 129.4 |
| Cin., Ind., St. L. & Chi..... | 221,186 | 201,150 | I. 20,036 | 9.9 |
| Net earnings... | 88,685 | 88,450 | I. 235 | 0.3 |
| Cleve., Col, Cin. & Ind ..... | 273,641 | 316,147 | D. 42,506 | 13.4 |
| Dan. & Norwalk. | 16,443 | 13,559 | I. 2,884 | 21.2 |
| *Month of April:* | | | | |
| Ala. Gt. South... | $82,831 | $85,306 | D. $2,475 | 2.9 |
| Char., Col. & A.. | 52,828 | 54,816 | D. 1,988 | 3.6 |
| Cin., N. O. & T. P. | 194,008 | 211,495 | D. 17,487 | 8.2 |
| Col. & Greenville | 39,481 | 45,728 | D. 6,247 | 13.6 |
| Denver & R. G... Western ..... | 68,175 | 67,290 | I. 885 | 1.3 |
| Des M. & Ft. D .. | 28,415 | 28,069 | I. 346 | 1.2 |
| Fla. Ry. & N Co. | 92,009 | 94,747 | D. 2,738 | 2.9 |
| Georgia Pacific.. | 49,853 | 32,079 | I. 17,774 | 55.5 |
| N. O. & Nor'east. | 57,893 | 26,390 | I. 31,503 | 119.3 |
| N. Y., Ont. & W.. | 138,100 | 142,549 | D. 4,449 | 3.1 |
| Rich. & Dan..... | 301,097 | 317,181 | D. 16,084 | 5.1 |
| St. Jo. & West... | 75,416 | 87,645 | D. 12,229 | 13.9 |
| Texas & St. L.... | 67,750 | 41,865 | I. 25,885 | 61.6 |
| Vicks. & Mer..... | 32,059 | 37,054 | D. 4,995 | 13.5 |
| Vicks., Shreve & Pacific..... | 23,181 | 5,475 | I. 17,706 | 321.9 |
| Va. Midland ..... | 124,094 | 130,841 | D. 6,747 | 5.1 |
| Western N. C.... | 37,289 | 33,834 | I. 3,455 | 10.2 |
| *Second week in May:* | | | | |
| Chi. & East. Ill.. | $29,084 | $23,513 | I. $5,571 | 23.2 |
| Chi., Mil. & St. P. | 415,000 | 457,805 | D. 42,805 | 9.3 |
| Chi. & Nor'west. | 428,500 | 436,100 | D. 7,600 | 1.7 |
| Cin., Ind., St. L. & Chi..... | 42,092 | 47,245 | D. 5,153 | 10.9 |
| Illinois Central.. | 198,900 | 187,330 | I. 11,570 | 6.2 |
| Iowa lines .... | 30,900 | 31,870 | D. 970 | 3.0 |
| Roch. & Pitts.... | 19,516 | 19,139 | I. 377 | 1.9 |
| St. L. & San F.. | 73,200 | 80,000 | D. 6,800 | 8.5 |

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

### Coal.

Coal tonnages for the week ending May 9 are reported as follows:

| | 1885. | 1884. | Inc. or Dec. | P. c. |
|---|---|---|---|---|
| Anthracite ..... | 608,449 | 87,717 | I. 520,732 | ..... |
| Eastern bituminous..... | 185,251 | 188,199 | D. 2,948 | 1.6 |
| Coke..... ..... | 47,985 | 64,600 | D. 16,615 | 25.7 |

Anthracite tonnage for the week is large, and compares with a week of stoppage last year. For the third and fourth weeks of this month the tonnage must be reduced considerably, if the companies are to keep within their allotments. Bituminous tonnage is increasing, the gain being chiefly in the gas coals, the shipments of which have been very light for several weeks.

Anthracite coal tonnages for April and the four month sending April 30 are given by Mr. John H. Jones, the Official Accountant, as below, the statement including the entire production of anthracite coal, excepting that consumed by employés and for steam and heating purposes about the mines:

| | April. | | Four months. | |
|---|---|---|---|---|
| | 1885. | 1884. | 1885. | 1884. |
| Phila. & Reading.... | 905,550 | 1,062,357 | 2,851,060 | 3,019,799 |
| Lehigh Valley..... | 438,291 | 565,815 | 1,420,056 | 1,717,069 |
| Del., Lack. & Western ..... | 295,227 | 459,571 | 1,209,519 | 1,454,364 |
| Del. & Hud. Canal Co. | 268,338 | 315,333 | 791,791 | 923,778 |
| Pennsylvania R. R.. | 273,559 | 257,455 | 979,845 | 898,900 |
| " Coal Co. | 109,567 | 136,041 | 358,259 | 382,686 |
| N. Y., L. E. & W..... | 45,691 | 31,638 | 160,994 | 105,336 |
| Total..... | 2,336,223 | 2,828,210 | 7,771,524 | 8,501,932 |

Decrease for the month, 491,987 tons or 17.4 per cent.; for the year, 730,408 tons, or 8.6 per cent.

The division of tonnage for the four months was as follows, compared with the allotment made by agreement, and also with the division last year:

| | Alloted. | 1885. | 1884. |
|---|---|---|---|
| Philadelphia & Reading..... ... | 38.85 | 36.7 | 35.5 |
| Lehigh Valley..... ..... | 19.60 | 18.3 | 20.2 |
| Delaware, Lackawanna & Western. .. | 16.05 | 15.6 | 17.1 |
| Delaware & Hudson Canal Co..... | 11.00 | 10.2 | 10.9 |
| Pennsylvania Railroad Co..... | 8.00 | 12.6 | 10.6 |
| Pennsylvania Coal Co..... .. .. | 5.00 | 4.6 | 4.5 |
| New York, Lake Erie & Western..... | 1.50 | 2.0 | 1.2 |
| Total ..... ..... .. ..100.00 | | 100.0 | 100.0 |

The Pennsylvania Railroad Co., it will be remembered, is not a party to the agreement.

The stock of coal on hand at tidewater shipping points, April 30, 1885, was 420,564 tons; on March 31, 431,424 tons; decrease, 10,860 tons, or 2.5 per cent. during the month.

Cumberland coal shipments for the week ending May 16 were 65,855 tons. Total to May 16 this year, 938,036; last year, 894,561; increase 43,475 tons, or 4.9 per cent.

### Cotton.

Cotton movement for the week ending May 15 is reported as follows, in bales:

| | 1885. | 1884. | Inc. or Dec. | P. c. |
|---|---|---|---|---|
| *Interior markets:* | | | | |
| Receipts.. ..... ... | 6,613 | 6,010 | I. 603 | 10.0 |
| Shipments..... | 17,591 | 11,423 | I. 6,168 | 44.7 |
| Stock, May 15.. ..... | 70,945 | 75,822 | D. 4,877 | 6.4 |
| *Seaports:* | | | | |
| Receipts. ..... | 9,413 | 8,694 | I. 719 | 0.8 |
| Exports..... | 25,657 | 11,447 | I. 14,210 | 123.6 |
| Stock, May 15... .....493,129 | | 523,131 | D. 30,002 | 5.7 |

The total movement from plantations for the year (from Sept. 1) to May 15 is reported at 5,558,416 bales; the decrease, as compared with last year, is 16,646 bales, the decrease from 1882–83 is 1,189,053 bales, and the increase over 1881–82 is 335,911 bales.

### Central Passenger Committee.

At the meeting of this Association in Cleveland last week 38 roads were represented, and Commissioner Pierson presided. A large part of the session was devoted to routine business, such as the settlement of theatrical and other special rates and of rates for land exploring parties. Nothing was done in regard to differential rates, and the subject was not discussed The chief resolution adopted was that no road shall withdraw from the Association without 30 days' notice, and each road shall be liable to penalties provided by the agreement during that 30 days. Another resolution provided for the deposit by each line of $500 with the Chairman, to cover possible fines of agents; but this was voted down.

### Western Freight Association.

The meeting of the Missouri River Traffic Association closed peacefully last week; the demands of the Missouri Pacific for a share in the Omaha traffic having been received and a percentage allowed that road. The arrangement finally reached was that the Missouri Pacific should receive 11½ per cent.; the Kansas City, St. Joseph & Council Bluffs and the Chicago, St. Paul, Minneapolis & Omaha each 5 per cent., the remaining 78½ per cent. to be divided among the other roads, as previously agreed upon. The percentages on cattle business from Nebraska were left to the arbitrators to decide. The subject of limited rates was discussed and an agreement made by which the rates between Chicago and Omaha will be the same as the Kansas City rates.

It was finally decided to change the name of the organization to the Western Freight Association. Mr. E. Faithorn was chosen Commissioner of the Association and will have his office in Chicago.

### Charges for Fumigating Stock Cars.

The Kansas Railroad Commission, after hearing certain complaints made, has decided that railroad companies have a right to make a charge for cleaning and disinfecting stock cars, as required by the State Sanitary Commission, in order to prevent the spread of contagious diseases among live stock. They have also decided that such charges may be large enough to cover the actual expenses, and that $1 per car is not an unreasonable amount.

## RAILROAD LAW.

### Highway Grade Crossings in Massachusetts.

An act recently passed by the Massachusetts Legislature confers upon County Commissioners jurisdiction to act on the petitions for the separation of grades at any level crossing of a railroad and a highway. They are required to give a hearing with 30 days' notice to all parties interested, and are not authorized to order a change of grade if it appears probable that the cost of the proposed change will exceed $3,000. An appeal from their decision is allowed to a special commission previously provided for by statute, and their order may be annulled if it shall be made to appear to the Special Commission that the cost of a change of grade of a highway will exceed $6,000. In cases arising in the city of Boston, where it is desired to do away with any grade crossing, the Board of Railroad Commissioners is to have jurisdiction, and may act either on petition of the Mayor and Aldermen of the city or directors of the railroad company interested.

## OLD AND NEW ROADS.

**Albany & Susquehanna.**—Notice is given by the Delaware & Hudson Canal Co., lessee, that holders of the second-mortgage bonds of this road maturing Oct. 1 next, can exchange them for the first consolidated 6s, guaranteed by the lessee, or can receive payment in cash at par and accrued interest, at their option, on presentation of the bonds at the lessee's office in New York. There are $1,627,000 of these bonds outstanding.

**Boston & Lowell.**—Parties interested are negotiating with this company for the extension of its leased Boston, Concord & Montreal road from the present terminus at Groveton Junction, N. H., northward to Colebrook, and thence by way of Connecticut Lake to a connection with the International road near Sherbrooke, P. Q. The extension from Groveton to Colebrook was surveyed several years ago, but nothing has been done toward its construction. The building of the proposed road will complete a new line to Montreal and Quebec. The distance from Groveton to the International road is about 75 miles. As far as Stewartstown, about 30 miles, the country is fairly well settled, but beyond that it is almost unbroken forest.

**Buffalo, New York & Philadelphia.**—The foreign bondholders have appointed Hon. Carl Schurz their agent in this country, with authority to negotiate with representatives of the American bondholders for the adoption of a plan of reorganization, which shall reduce the company's fixed charges to an amount within its probable income.

A dispatch from Pittsburgh, Pa., May 20, says: "In the United States Circuit Court this morning Samuel Dickson, of Massachusetts, on behalf of Edward W. Kinsley, filed a bill in equity against the Buffalo, New York & Philadelphia Railroad Co. and the Fidelity Insurance, Trust & Safe Deposit Co. of Philadelphia, asking for the appointment of a receiver for the railroad corporation and its leased lines. It is claimed that the road has a bonded debt of over $25,000,000, and has defaulted on its interest since March last. Mr. Kinsley holds $17,000 of the bonds, and he becomes a party to the suit in behalf of himself and other stockholders, holding two-thirds of the bonds. In the court this morning a decree was made appointing G. Clinton Gardner as Receiver, and fixing the amount of his official bond at $200,000. This move is preparatory to a reorganization of the company."

**Canadian Pacific.**—A Montreal dispatch states that on May 18 the last gap in this road was closed, completing the main line of the road from Montreal to the Columbia River, just west of the crossing of the Rocky Mountains.

**Cape Girardeau Southwestern.**—This company is arranging to build a branch from its road at a point near the crossing of the Iron Mountain road, southward into Duncan County, Mo., where it will connect with the Texas & St. Louis road.

**Central Pacific.**—This company's earnings for the three months of the current year to March 31 have been:

| | Gross earnings. | | Net earnings. | |
|---|---|---|---|---|
| | 1885. | 1884. | 1885. | 1884. |
| January | $1,570,755 | $1,449.785 | $523,008 | $208,620 |
| February | 1,364,619 | 1,402,471 | 372,794 | 209,150 |
| March | 1,477,388 | 1,472,785 | 392,204 | 170,879 |
| Three months | $4,412,762 | $4,325,041 | $1,288,006 | $588,649 |

The gross earnings for the three months show an increase of $87,721, or 2.0 per cent., while the gain in net earnings was $699,357, or 118.8 per cent. In the early months of 1884 the earnings were reduced and expenses increased by extensive wash-outs on the line in California.

**Charleston & Pittsburgh.**—This company is now engaged in securing right of way for its proposed line, and has also asked for a grant of terminal grounds in Charleston. The projected line is from Charleston, W. Va., up Elk River, to a connection with the Baltimore & Ohio near Clarksburg.

**Chicago, St. Louis & Nashville.**—This company has filed articles of incorporation in Illinois to build a railroad from East St. Louis by way of Metropolis, to the Ohio River opposite Paducah, Ky., at which point it is to connect with a projected line to Nashville, Tenn. The project has already been incorporated two or three times under different names.

**Cincinnati, Hamilton & Dayton.**—In Cincinnati, May 18, in the Superior Court there was a hearing in the suit brought by George Hafer to restrain Hugh J. Jewett from transferring to the New York, Lake Erie & Western Co. the proxy for the majority of the stock of this company held by him. At the same time a cross petition and answer was presented on behalf of the New York, Lake Erie & Western Co. asking that Mr. Jewett be required to transfer to that company the proxy, and in the event of his continued refusal to do so, that he be enjoined from voting on the stock. The claim made by Mr. Hafer and those associated with him is, that the so-called pool stock, which is held by Mr. Jewett in trust, was obtained by him on an agreement to pay dividends, and that such agreement was a fraud upon the other stockholders who did not join in the pool.

**Cincinnati, Indianapolis, St. Louis & Chicago.**—This company's statement for March is as follows:

| | 1885. | 1884. | Inc. or Dec. | P. c. |
|---|---|---|---|---|
| Earnings | $221,186 | $201,150 | I. $20,036 | 9.9 |
| Expenses | 132,501 | 112,700 | I. 19,801 | 17.5 |
| Net earnings | $88,685 | $88.450 | I. $235 | 0.3 |
| Fixed charges | 50,000 | 50,083 | D. 83 | 0.2 |
| Surplus | $38,685 | $38.367 | I. $318 | 0.8 |
| Surplus to Feb. 28 | 232,098 | 156,495 | I. 76,203 | 48.8 |
| Total surplus, 9 mos. | $271,383 | $194,862 | I. $76,521 | 39.2 |

In February, 1884, the business of this road was seriously affected by the floods in the Ohio, and the stoppage of business at Cincinnati.

**Connecticut Central.**—In Hartford, Conn., May 18, the petition of stockholders of this company asking that the New York & New England Co. be joined with the State Treasurer in the action of the foreclosure of the mortgage on this road was denied, the Court holding that the remedy sought by the stockholders is to be found in the term of the lease of the road and not in an intervention in the foreclosure suit.

**Delaware, Lackawanna & Western.**—The Buffalo *Express* of May 14 says: "The Delaware, Lackawanna & Western Railroad Co. broke ground at the foot of Main street yesterday for a new depot. It is to occupy the lower part of the west side of that street, in fact the only space in that vicinity where a building can be erected. The building is to occupy all the available territory on the square, and will be wedged in between the street, the Lackawanna tracks, and the brick block at the corner of Dayton street. Still it is able to assume very fair proportions. It will have a frontage on Main street of about 80 ft., and will average from east to west a width of about 50 ft., being according to force of circumstances widest at the north end and gradually narrowing as it extends southward. It will be of brick, one story, with ceilings about 20 ft. high, and will put on quite a holiday style by having awning roofs all round it. The accommodations inside will be ticket office, baggage and waiting rooms. The business offices of the company will remain where they are, in the old Ætna building.

"The plans were brought to the city by Mr. S. Griffith, Superintendent of Buildings for the road, who returned eastward last evening. The mason work will be done by Mr. W. S. Grattan, and the carpenter work by the company. All speed will be made with the job, and a complete building is promised inside of a month."

This company's statement to the New York Railroad Commission gives the following figures for its leased lines in that state for the quarter ending March 31:

| | 1885. | 1884. | Inc. or Dec. | P. c. |
|---|---|---|---|---|
| Earnings | $1,027,795 | $1,025.304 | I. $2,491 | 0.2 |
| Expenses | 526,174 | 635,273 | D. 109,099 | 17.2 |
| Net earnings | $501.621 | $390,031 | I. $111,590 | 28.5 |
| Other income | 753 | ..... | I. 753 | .... |
| Total | $502,374 | $390,031 | I. $112.343 | 28.8 |
| Charges | 546,384 | 505,679 | I. 40,705 | 8.0 |
| Deficit | $44,010 | $115,648 | D. $71,638 | 61.8 |

The charges include all rental charges and taxes paid by the lessee. Their amount is partly estimated for this year.

**Dubuque & Dakota.**—Arrangements are being made for the extension of this road from Sumner, Ia., eastward to Manchester, on the Illinois Central, and from Hampton westward to Dows, on the Burlington, Cedar Rapids & Northern. The road now extends from Sumner westward to Hampton, 64 miles.

**Eastern.**—The bill now pending before the Massachusetts Legislature to authorize this company to issue preferred stock in place of all its certificates of indebtedness over $10,000,000 has been passed, to be engrossed by the Senate, with an amendment providing that the payment of dividends on the proposed issue of preferred stock shall not be made if any other disposition of the earnings is required by it in the existing contract. It is understood that the passage of the bill, which is probable, will not have any effect until the Supreme Court has given a decision upon the question whether the conversion of these certificates of indebtedness into preferred stock, and the payment of dividends on the same, can be legally effected without violating the original contract with the creditors under which the certificates of indebtedness were issued.

**East Florida Land Co.**—This company proposes building a railroad from a point on the Matanzas River to Windermere, and thence south to the Halifax River, a distance of about 40 miles.

**Elmira, Cortland & Northern.**—The round-house of this road at Cortland, N. Y., was burned down on the morning of May 17, and 4 locomotives which were in the house were destroyed or very badly damaged. The loss was about $50,000.

**Fitchburg.**—The stockholders of this company having authorized the issue of $500,000 additional stock, the directors have decided to offer 2,500 shares of this stock to stockholders of record on May 16, each of whom will be entitled to take at par 1 share of new stock for every 20 shares now held. The option will continue until June 22 next, and stockholders subscribing for the new stock will be required to pay for it in cash on June 25. The latest quotations for Fitchburg stock on the Boston market were 121, at which rate the privilege of purchasing the new stock at par would be equivalent to a dividend of about $1 per share.

**Fonda, Johnstown & Gloversville.**—This company's statement for the quarter ending March 31 shows gross earnings of $33,874. The net earnings were $10,923, and the other income $630, making a total of $11,553. Interest, taxes, etc., were $10,031, leaving a surplus of $1,522, which compares with a deficit of $13,212 for the corresponding quarter last year, showing a gain of $14,734 this year.

**Fort Benton & Northern.**—Surveys are being made for a railroad to extend from Fort Benton, Mont., northward to the Canadian Pacific at Medicine Hat. The distance is 155 miles, mostly over a level prairie country, with no difficult work except at the crossing of the Marais River. It is said that Canadian capitalists will build the road.

**Fort Bragg.**—This company has been incorporated in California to build a railroad from Fort Bragg Harbor, in Mendocino County, eastward 20 miles to the headwaters of the Noyo River, with a branch 10 miles long running to Ten Mile River. It will be a lumber road.

**Fort Smith, Wellington & Northwestern.**—This company has been organized to build a railroad from Fort Smith, Ark., northwest through the Indian Territory to Wellington, Kan., and thence to a point on the western line of the state of Kansas in Greeley County, about half-way between the Kansas Pacific and the Atchison, Topeka & Santa Fe. The list of incorporators does not include any well-known names.

**Houston & Texas Central.**—A circular has been addressed to holders of the first-mortgage main line and Western Division bonds by the trustees, saying that counsel, who have just returned from Texas, report that they have secured, in actions begun in February, orders of Court adjudging: (1) That the trustees are entitled to proceeds of past land sales under deeds of trust, and that accounting be forthwith rendered by the company and receivers. (2) That all future sales be made through trustees, and proceeds paid them. (3) That no part of the past or future land sales be used by the receivers, but be paid over as stated. The result of this is, that as soon as the trustees affirm said sales, they will receive about $1,000,000, to be applied for the purpose of the trust, and that the exclusive rights of the bondholders to all proceeds from land sales will be respected.

**Lake Erie & Western.**—The consolidation of this company with the Lake Erie & Mississippi (which was organized to build the extension of the road from Bloomington, Ill., to Peoria) has been completed and the necessary certificates filed in the states through which the road runs.

**Lake Shore & Michigan Southern.**—This company makes the following statement for the quarter ending March 31:

| | 1885. | 1884. | Inc. or Dec. | P.c. |
|---|---|---|---|---|
| Earnings | $3,235,071 | $3,684,021 | D. $448,950 | 12.2 |
| Expenses | 2,338,478 | 2,330.831 | I. 7,647 | 0 3 |
| Net earnings | $896,593 | $1,353,190 | D. $456,597 | 33.8 |
| Intererest and rentals | 956,199 | 930,167 | I. 29,032 | 3.0 |
| Deficit | $62,606 | ..... | ..... | .... |
| Surplus | ..... | $423,023 | ..... | .... |

The total loss, as compared with last year, is thus $485,629, showing the worst quarter the road has yet had to pass. Taxes are included in the expenses given above.

**Louisville & Nashville.**—The recent decision of the United States Supreme Court in the Tennessee bond cases has released $800,000 of this company's Henderson Division bonds, which have been locked up in trust for the last 6 years pending a decision in these cases. These bonds have been disposed of, reducing the outstanding loans of the company to about $350,000. The financial condition of the company is now so much improved that it has negotiated for the return of $2,000,000 of last year's issue of 10-40 adjustment bonds, which have been held by a syndicate of bankers under an option expiring in October next. They are withdrawn for the reason that it will not be necessary for the company to dispose of them at present.

**Marquette, Houghton & Ontonagon.**—The Marquette (Mich.) *Mining Journal* of May 16 says: "General Manager John Hornby, of the Marquette, Houghton & Ontonagon Railroad, issued a circular Thursday announcing that his company, 'having acquired the property of the Marquette & Western Railroad, will assume control of the same on Friday, May 15, 1885.' Also that 'the current time card, the general rules and regulations and all general and special orders pertaining to the management and operation of the Marquette & Western Railroad will be continued in force on that road until further notice,' so there will be no withdrawal of trains or changes in the operating forces. The only real changes noticeable to the public will be the taking out of trains on the M. & W. by M., H. & O. locomotives. Employés of the former road will, of course, have to make their returns in the future to the heads of the several departments of the M., H. & O. Co. Several of the stations up the road are also to be closed, and this will result in the discharge of a number of men."

**Maryland Central.**—Suit has been filed by the Central Trust Co. of New York against this company to foreclose a mortgage and for the appointment of a receiver. The road is already in possession of a receiver appointed some months ago.

**Memphis, Selma & Brunswick.**—Track on this road is now all laid from Memphis, Tenn., to Holly Springs, Miss., a distance of 44 miles, the last rail having been laid at Byhalia, May 16. The road was begun several years ago, and was then nearly all graded and some track laid, when the company failed and nothing more was done until last year, when the company's property was placed in the hands of a receiver. An arrangement was made by which the contracting firm of Dunavant, Kelly & Piper, who were already large creditors of the company, agreed to finish the road to Holly Springs, receiving therefore $300,000 in certificates. Under the arrangement, which received the sanction of the Court, the old stockholders had the option of taking up these certificates within 30 days after the completion of the road and receiving possession of the line. They have, however, notified the directors that they will not avail themselves of this option, and the road therefore becomes the property of the contractors. They intend for the present, it is understood, to operate it, but will probably dispose of it as soon as they can do so to advantage.

**Mexican National.**—Mexican dispatches report that this company's concession from the Mexican government is in serious danger of forfeiture. Under the modified contract with the government, made Jan. 11, 1883, the company bound itself to complete 500 kilometers of road within two years, 200 kilometers to be on the Matamoras & Monterey line. The time for compliance with this contract expired Jan. 11 last; but in the two years the company has completed only 100 kilometers of road, and the government has now a right to forfeit the concession, if it desires to do so. Under the concession the government can transfer the road to another company, the work already done being valued by three appraisers, who shall decide on the amount to be paid to the present owners. It is possible, however, that some new arrangements will be made with the National Co.

**Mexican Railroad Notes.**—The following notes are from the *Mexican Financier* of May 9:

Gov. Cañedo, of Sinaloa, is endeavoring to secure railroad connection between Mazatlan and Rosario.

It is announced that Mr. José Ives Limantour has bought the railroad running from Pueblo to Matamoros Izúcar,

Work is to be begun soon on the Zacualtipan Railroad, which is to aid in the opening up of the coal fields in the state of Hidalgo.

The government engineers have accepted the Tajo of Nochistongo, after a careful resurvey of the cut in conjunction with the Central's engineers.

Contracts for cable roads in Pachuca have been secured by Mr. J. M. Thompson, who has gone to Guanajuato for the purpose of getting the local capitalists interested in this method of transportation.

**Minneapolis & St. Louis.**—This company has begun suit against the St. Paul, Minneapolis & Manitoba to enforce its right to operate a single track in Minneapolis, the complaint alleging that the Manitoba Co. has threatened to tear up the track in question, which connects the road with the large flouring mills in and about Minneapolis. This company claims right to the use of the track in question and the land on which it is laid, under a contract made with the old St. Paul & Pacific Co. in 1874. The company also asks the Court to appoint a commission to appraise and condemn certain lands which it desires to use, in order to make a connection between its own tracks and those of the St. Paul & Northern Pacific road.

**Minnesota & Northwestern.**—The track of this road is now completed from Cascade, Minn., where tracklaying began, to West St. Paul, 32 miles, and the tracklaying force has been transferred to the section from Cascade southward. Active preparations are going on all along the line and a large force is employed in bridge building and grading in the vicinity of Austin, Minn. The length of the road, from St. Paul to Mona, will be 110¼ miles, and the stations along the line have all been located.

**Missouri Pacific.**—A contract has been closed for the extension of the Central Branch road, operated by this company, from Bull City, Kan., westward to Stockton, 21 miles. It is not thought that any further extension will be made this year.

**New York Arcade.**—The New York Arcade Railroad, which proposes to run trains under Broadway, from the Battery to Harlem, has just, it is stated, made contracts by which the contractors are bound to complete it to Forty-second street within four years. Four tracks will be laid side by side, to occupy all the space between the curbstones. The work of construction is to be done under the direction of a board of engineer-commissioners appointed by the Mayor. The capital stock of the company is $20,000,000. The inner trains are to stop once a mile, entrance and exit to be obtained by dropping the outer or way trains five or six feet at those points, so that passengers can pass over them.

**New York, Chicago & St. Louis.**—In Cleveland, O., May 15, the Central Trust Co., as trustee under the first mortgage, filed a petition asking that the Court make no order permitting the issue of receiver's certificates, or otherwise impairing the security of the first mortgage. The Court took the petition under consideration.

**New York, Lake Erie & Western.**—This company's quarterly report gives the following figures for the quarter ending March 31 and the half year from Oct. 1 to March 31:

| | Quarter. | | Half-year. | |
|---|---|---|---|---|
| | 1885. | 1884 | 1884-85 | 1883-84. |
| Earnings | $4,255,590 | $4,559,145 | $9,397,170 | $10,974,741 |
| Expenses | 3,387,747 | 3,974 601 | 6,981,313 | 8,491,992 |
| Net earnings | $867,843 | $584,544 | $2,415,857 | $2,482.749 |
| Other income | 151.296 | 293,'51 | 459,343 | 481,278 |
| Total | $1,019,139 | $877,695 | $2,875,200 | 2,964,027 |
| Interest, etc | 1,764.746 | 1,7 3.860 | 3,488,934 | 3,646,011 |
| Deficit | $745,607 | $8.6,165 | $613,734 | $681,984 |

The figures given above differ somewhat from the company's monthly statements, probably on account of the different arrangement required by the Railroad Commission forms. They include 68 per cent. of New York, Pennsylvania & Ohio earnings.

**New York, West Shore & Buffalo.**—The official statement of the latest plan of reorganization for this company is as follows:

The plan agreed upon by the two committees (Colgate and Hewitt) still contemplates the acquisition of the whole property from Weehawken to Buffalo. The modifications are substantially as follows:

First—The first mortgage is reduced to $20,000,000, and in case the terminals are not purchased, to $15,000,000.

Second—Provision is made for the further issue of first-mortgage bonds to the extent of $5,000,000 if deemed necessary by the new company, after one year has elapsed from its organization, but this issue cannot be made without the approval of two-thirds of the holders of the second-mortgage bonds and first-preferred stock.

Third—The old first-mortgage bonds are exchangeable into new 5 per cent. second-mortgage bonds, amounting to $50,000,000; these bonds are convertible into first-preferred 5 per cent. stock, and possess voting power; $5,000,000 of such preferred stock is issued to the holders of the bonds in liquidation of interest. Interest and dividends are payable to the extent earned in any one year, and are not cumulative.

Fourth—Common stock is issued one share of new to two shares of old stock, on the payment of an assessment of $5 per share of new stock, for which payment certificates will be issued, redeemable in first-mortgage bonds at par.

Fifth—No obligation is imposed to purchase the terminals, but if the terminals are purchased upon terms satisfactory to the committee, payments may be made either wholly or in part in the first or second-mortgage bonds, and so far as the latter are required for this purpose, the amount of the second mortgage will be increased.

**Ogdensburg & Lake Champlain.**—The Boston *Advertiser* says: "The gross earnings of the Ogdensburg & Lake Champlain for the quarter ended March 31, were $88,706, and the operating expenses $81,583. There was other income of $1,408, so that the net was $8,531. One quarter of the year's interest, taxes and miscellaneous expense was $59,889. But as the winter is the hardest quarter of the year, it is best to take into account the best quarter also. The net earnings for three months ended Dec. 31 paid a quarter of the annual charges, and left a surplus of $24,113. If the operations of the road show any profit for the whole year it will be small. The annual report is expected soon."

**Ohio Central.**—As noted briefly last week, the Reorganization Committee has addressed a circular to the bond and stockholders, submitting a proposal for a consolidation with the Columbus, Hocking Valley & Toledo on the terms made below. The committee strongly recommends this arrangement, and says in conclusion: "We may add that if the proposed arrangement is made it is understood that the Columbus, Hocking Valley & Toledo will guarantee the new Toledo & Ohio Central Co.'s bonds in consideration of mutually advantageous agreements between the two companies. Prompt decision on your part is advisable, as without this alliance the $2,000,000 surplus bonds of your new company must be used to purchase equipment and terminals at once. Please to communicate to us your wishes as soon as possible, not later than May 20."

The proposal from the Columbus, Hocking Valley & Toledo is as follows:

"Deeming it for the interest of the holders of the capital stock of the Columbus Hocking Valley & Toledo Railway Co. and for those who will be entitled to shares of the capital stock of the corporation to be known as the Toledo & Ohio Central Railway Co., which is to be organized by the purchasers under the foreclosure sale of the main line of the Ohio Central Railroad Co. made April 15, 1885, that the exchange hereby proposed should be made: We, the undersigned, owners and representatives of the owners of all the capital stock of the Columbus, Hocking Valley & Toledo Railway Co., do hereby propose to those who are to become the holders of stock of the Toledo & Ohio Central Railway Co. to exchange stocks upon the following terms, viz.:

"1. For the new preferred stock of the Toledo & Ohio Central we will exchange stock of the Columbus, Hocking Valley & Toledo at par, share for share, to the extent of three-fourths, of the amount of preferred stock of the Toledo & Ohio Central to which each party consenting hereto will become entitled.

"2. For the new common stock of the Toledo & Ohio Central we will exchange on the basis of one share of the Columbus, Hocking Valley & Toledo stock for two shares of the Toledo & Ohio Central common stock to the extent of three-fourths of the amount to which each person consenting hereto will become entitled.

"3. Each holder of the Toledo & Ohio Central stock accepting this offer shall put into the hands of the Central Trust Co. (or two persons to be hereafter named) as trustees, by an irrevocable transfer, his remaining one-fourth of preferred and common stock of the Toledo & Ohio Central, and the undersigned shall also put into the hands of the said trustees by an irrevocable transfer all the said preferred and common stock of the Toledo & Ohio Central acquired by us in exchange under the terms hereof, which trust shall be for the benefit of the parties on both sides of the contract hereby proposed and their successors in interest, and shall be constituted by a written agreement drawn in such form as shall be advised by counsel, providing, among other things, for the voting upon the said shares of stock so deposited in trust and for the maintaining in good condition the property of the Toledo & Ohio Central. All dividends or net income of the said shares of stock of the Toledo & Ohio Central, so deposited in trust, shall be received and collected by the said trustees, but shall be by them paid over for the use and benefit of all the parties to the contract hereby proposed, and their successors in interest, as stockholders of the Columbus, Hocking Valley & Toledo Co. in a manner to be provided by the said agreement of trust.

"4. This proposal is upon the understanding that the total preferred stock of the said Toledo & Ohio Central shall not exceed $3,108,000 at par, and that the total common stock of the said company shall not exceed $1,600,000 at par; and this proposal is made also upon the understanding that the total capital stock of the Columbus, Hocking Valley & Toledo at the time of the exchange hereby proposed shall not exceed the sum of $11,700,000.

"5. This proposal is also upon the understanding that the said Toledo & Ohio Central is to make its first mortgage to secure an issue of not exceeding $5,000,000, at par, of its 5 per cent. 50-year gold bonds, the interest on which shall begin to run from July 1, 1885, and be paid semi-annually; but that only $3,000,000, at par, of said bonds shall be issued by the said company in the first instance, and the remaining $2,000,000 of the said bonds shall not be countersigned by the trustee thereof nor issued by the company, except upon the consent of the holders of three-fourths in amount of the said $3,000,000 of bonds first issued, and then only for the purpose of paying for terminal property or railway equipment, the title of which shall be shown to the trustee of the said mortgage to have been actually conveyed to the said Toledo & Ohio Central Co. by such evidence as the mortgage shall require.

"6. This proposal is to become binding upon the proposers only upon the confirmation of the aforesaid foreclosure sale of the main line of the Ohio Central Railroad, and the passing of a good title to the property so sold to the Toledo & Ohio Central Railway Co., pursuant to the said sale and the plan of reorganization under which the same was purchased. Stevenson Burke, Charles Hickox, J. H. Wade, C. H. Andrews, Wm. J. Hitchcock, Andrews, Hitchcock & Co., Wm. J. McKinnie, N. P. Payne, Payne, Newton & Co., J. J. Purcell, Post, Martin & Co., and M. M. Greene, Trustee."

**Oregon Improvement Co.**—This company's statement for March and for the four months of the fiscal year from Dec. 1 to March 31 is as follows:

| | March | | Four Months. | |
|---|---|---|---|---|
| | 1885. | 1884. | 1884-5. | 1883-84. |
| Gross earnings | $225,527 | $291,628 | $898,893 | $1,050 416 |
| Operating expenses | 194,846 | 228,940 | 740,611 | 863,506 |
| Net earnings | $30,681 | $62,698 | $158,282 | $186,910 |

For the year the gross earnings decreased $151,523 (14.4 per cent.) and the expenses $122,895 (14.2 per cent.); the result being a decrease of $28,628 (15.3 per cent.) in net earnings.

**Oregon Railway & Navigation Co.**—It is now said that the proposed lease of this company's property to the Union Pacific and the Northern Pacific jointly will not be made, on account of the doubts as to whether the Union Pacific has power legally to make such a lease. The negotiations have not been dropped, however, and it is said that the plan now in contemplation is, that the lease shall be made by the Northern Pacific and the Oregon Short-Line companies, or else that the Northern Pacific shall make the lease alone, at the same time making a traffic contract with the Oregon Short-Line.

**Osage Valley.**—This company has been organized to build a railroad from Rich Hill, Mo., eastward to Deepwater, on the Kansas City, Clinton & Springfield road, a distance of about 40 miles. The road is controlled by the owners of the Kansas City, Fort Scott & Gulf road.

**Pennsylvania.**—In the Court of Common Pleas at Reading, Pa., May 18, a decision was given dissolving the injunction obtained by the Philadelphia & Reading Co. against the construction of a grade crossing of the track of the Pennsylvania Schuylkill Valley road over certain freight tracks of the Reading road. This enables the Pennsylvania Co. to build its branch line to the large manufacturing establishments on Front street, in Reading.

**Pittsburgh, Fort Wayne & Chicago.**—The statements presented at the annual meeting this week show for 1884 gross earnings, $9,164,042; net income, $2,907,465; interest, dividends and other charges, $2,902,700; surplus, $4,465. The usual 7 per cent. dividends are included in the charges.

**Rochester & Pittsburgh.**—In the case of the foreclosure of this road certain contesting stockholders represented to the Court that the report of the Referee should not be accepted, for the reason that the bonds which had been accepted in his report at their par value had been sold by the company at considerably less than par, and that the firm of Iselin & Co. were not the owners of $1,369,000 of bonds, as stated by the Referee, but merely held those bonds as security for advances made. The contestants also claim that the President and other officers should account for profit made by them in the sale of stocks and bonds. The Court did not accept all these claims, but ordered the report to be sent back to the Referee for correction and withheld the decree of foreclosure until the amended report shall have been made.

This company's report for the quarter ending March 31 is as follows:

| | 1885. | 1884. | Inc or Dec. | P. c. |
|---|---|---|---|---|
| Earnings | $257,080 | $227 896 | I. $29,174 | 12.8 |
| Expenses | 198,221 | 224,437 | D. 26,216 | 11.7 |
| Net earnings | $58,849 | $3,459 | I. $55,390 | .... |
| Interest, etc | 103,869 | 81,396 | I. 22,473 | 27.7 |
| Deficit | $45,020 | $77,937 | D. $32,917 | 42.2 |

Interest does not include the charges on the second-mortgage bonds, on which foreclosure proceedings are now pending.

**Rome, Watertown & Ogdensburg.**—The statement for the quarter to March 31 is as follows:

| | 1885. | 1884. | Inc. or Dec. | P.c. |
|---|---|---|---|---|
| Earnings | $330 692 | $324,903 | I. $5,789 | 1 8 |
| Expenses | 257,987 | 242.643 | I. 15 344 | 6.3 |
| Net earnings | $72,705 | $82,260 | D. $9,555 | 11.6 |
| Other income | 19 350 | ... .... | I. 19,356 | .... |
| Total | $92 061 | $82,260 | I. $9,801 | 11.9 |
| Interest, etc | 157,662 | 112,493 | I 45,169 | 40.3 |
| Deficit | $65,601 | $30.233 | I. $35,368 | 11 7 |

The first quarter of the year is the time of lightest earnings on this road, and the deficit is usually made up in the later months.

**Scioto Valley.**—Holders of about one-third of the first-mortgage bonds, who are opposed to the company's plan for the substitution of an issue of consolidated bonds, met in New York, May 20, and appointed Messrs. J. B. Binsse, H. J. Chittenden, W. Opdyke, J. L. Robertson and T. D. Rogers a committee to represent their interests and take measures for their protection.

**Tavares, Apopka & Gulf.**—A contract has been let for the construction of this road, which is to run from Tavares, Fla., to Lake Apopka, and thence to Minneola and Lake San Juan.

**Tavares, Orlando & Atlantic.**—Track is reported laid on this new road from Tavares, Fla., the terminus of a branch of the Florida Railway & Navigation Co.'s line, southeast to Orlando, a distance of 28 miles.

**Texas & St. Louis.**—A petition has been presented to the United States Circuit Court by a number of the stockholders and bondholders who desire to intervene in the foreclosure suit for the purpose of testing the foreclosure of the mortgage. In their petition it is charged that the foreclosure proceedings have not been conducted in good faith; that the company should have made a defense in the suit, and that the object of the persons conducting it is to force the property to sale for their own purposes.

**Toledo, Cincinnati & St. Louis.**—At the stockholders' meeting in Toledo last week, a committee was appointed to demand the books and records from Receiver Craig. He replied that they were not within the state. It was then ascertained that 170,580 shares of stock, or $8,529,000, was represented, owned by New York, Boston and Ohio parties. After declaring all offices vacant and electing a new board, as already published, the following preamble and vote were passed:

"*Whereas*, Our railroads and property are in the hands of receivers; and, whereas, certain portions are claimed to have been sold under judicial proceedings; and, whereas, the financial condition of this company is unsettled and complicated by reason of alleged liens and claims against said company and its property; and, whereas, there are grave doubts as to the validity and regularity of said judicial proceedings, and as to the legality of many of said liens and claims; and, whereas, the conduct and management of the corporation is seriously embarrassed by the secreting or withholding of its books, records and other papers and documents;

"*Therefore, voted*, That the directors are authorized and instructed to demand and take possession of all books, records, papers and documents belonging to the company, and to supply the place of such as they are unable to obtain; to take possession and control of such property of this company as they find without legal control; to investigate and examine all such judicial proceedings and sales, and all said alleged liens and claims, and to appear and defend all suits or actions now or hereafter pending against the company or its property; and, if in their judgment advisable, the board is hereby instructed to contest the regularity and validity of any judicial proceedings or sales that have been heretofore terminated or consummated against this company or any portion of its property, and to investigate thoroughly any and all contracts or arrangements of any kind heretofore entered into between this company and any trust company or construction company; and for these purposes the directors are authorized to employ such legal counsel and accountants as may be proper or necessary."

**Union Pacific.**—A suit is pending in the New York Supreme Court, begun by Isaac Blumenthal, as a bondholder, to compel Jay Gould and Russell Sage, as trustees under the Kansas Pacific consolidated mortgage, to account for 29,986 shares of Denver Pacific stock, which were originally part of the securities pledged to the bondholders under the mortgage, but were subsequently surrendered by the trustees to the company. It is charged that this stock was surrendered under an order of Court obtained by collusion and false representations. The point now before the Court is an order for the examination of the trustees as to the facts in the case.

**Vermont Railroads.**—It appears from the returns made to the Commissioner of state taxes of Vermont that the railroads paid nearly half the taxes assessed against corporations in 1884. The State Treasurer received from the companies operating roads in Vermont $93,860, or $8,325 more than the same corporations paid in 1883. The gross earnings of all the Vermont roads in 1884 were as follows:

| | |
|---|---|
| From passengers | $2,027.081 |
| From freight | 3,759,930 |
| From mails, express, etc | 244.361 |
| Total | $6,031,872 |

The total number of miles of road in operation in the state is 946, and the average gross earnings per mile in 1884 were about $6,300. It is estimated that the total cost of the roads in the state was $41,000,000, half of which amount is represented by capital stock.

**Wilmington & Weldon.**—The contract for 20 miles of the new cut-off from Wilson, N. C., through Fayetteville, to Florence, S. C., has been let to J. D. Hardin, of Cheraw, S. C. The grading of 50 miles more has been let to Montgomery, Wright & Co., of Wilmington. These 70 miles, which are to carry the road from Wilson to Fayetteville, are to be completed by April 1, 1886.